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ABSTRACT

This document, fourth in a series of 11 subvolumes of a handbook prepared to provide training for educational research and development personnel in the development of instructional materials, deals with the task of stating criterion and preparatory objectives. The document content is arranged according to the sequential steps involved in performing the task. Step 1, planning the formulation of objectives for each lesson, involves making decisions regarding (a) number and types of objectives and subobjectives to develop for a lesson; (b) recall/transfer requirements for each objective; (c) availability to students of performance aids; (d) direction of performance for each objective; and (e) size of sample of performance to be used as evidence of mastery of an objective. Step 2, preparing a statement of objectives for each lesson, involves developing the following: (a) a statement of criterion objectives to be used in designing instruction; (b) a statement of subcriterion and preparatory objectives to be used in designing instruction; and (c) a statement of objectives to accompany instructional materials to be given to students. Background information includes a presentation of the uses to which statements of objectives are put, ways in which statements of objectives supplement information, and required characteristics for statements of objectives. (PD)

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A Technology For Developing Instructional Materials

3 HANDBOOK

A. PLAN STUDY OF CRITERION BEHAVIORS
B. COLLECT AND ANALYZE DATA ABOUT CRITERION BEHAVIORS
C. SEQUENCE AND GROUP CRITERION BEHAVIORS
D. STATE CRITERION AND PREPARATORY OBJECTIVES
E. PLAN SIMULATION BASED ON INSTRUCTIONAL AND LOGISTICAL NEEDS
F. DEVELOP DIAGNOSTIC AND EVALUATIVE TESTS
G. FORMULATE INSTRUCTIONAL STRATEGIES
H. PLAN ACCOMMODATION OF INDIVIDUAL DIFFERENCES
I. DEVELOP INSTRUCTIONAL MATERIALS
J. EVALUATE INSTRUCTIONAL MATERIALS

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VOLUMES IN THIS SERIES

1. USER'S MANUAL
2. ORIENTATION
3. HANDBOOK
   (eleven sub-volumes)
4. WORKBOOK
5. FINAL EXERCISES

FOREWORD

This is one of a series of eleven HANDBOOK sub-volumes which has been prepared to provide training for educational R&D personnel in the development of instructional materials.

The USER'S MANUAL, which accompanies the series, describes the role each volume is designed to play and the sequence recommended for its use in the training process. The user is, therefore, urged to read the instructions in the USER'S MANUAL before using this or any other separate volume.

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The author is indebted: to Dr. Robert Fitzpatrick for reviewing portions of the series of volumes and for informal discussions concerning several training issues; to Mrs. Zita Glasgow for the first and critical use of this volume; and, not least, to Miss Kathleen Gubala for her tireless preparation of the complex manuscript required by this HANDBOOK.

George L. Gropper
March 1973

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D.

IDENTIFICATION
MATRIX

USES TO WHICH STATEMENTS OF OBJECTIVES ARE PUT BY DEVELOPERS AND BY STUDENTS

USES	DEVELOPER USES	STUDENT USES
CRITERIA	*A statement of objectives serves as a basis for* ••*Development of tests* ••*Formulation of instructional strategies* ••*Design of instructional materials*	*A statement of objectives serves as a basis for:* ••*Identifying what post-instructional performance will be expected of the student* ••*Identifying what types of information the student should look for during instruction*

D.

IDENTIFICATION MATRIX

THREE WAYS IN WHICH STATEMENTS OF OBJECTIVES SUPPLEMENT INFORMATION PROVIDED BY RESULTS OF ANALYSES OF BEHAVIOR

TYPE OF SUPPLEMENT	1. EXPLICIT PRESCRIPTION OF STANDARDS	2. EXPLICIT IDENTIFICATION OF HOW MUCH OF CRITERION BEHAVIOR WILL BE SAMPLED	3. IDENTIFICATION OF SUB-OBJECTIVES
CRITERIA	*A statement of objectives identifies post-instructional requirements for:* *• •Recall vs. transfer* *• •One vs. two directions of performance* *• •Availability vs. non-availability of performance aids*	*A statement of objectives identifies for those behaviors involving classes of INPUTS or classes of ACTIONS:* *• •The range of instances within a class to be sampled on post-instructional tests*	*The preparation of objectives and sub-objectives identifies what are expected to be teaching units based on:* *• •Anticipated student difficulties in acquiring behaviors and their constituent components*
TO BE COVERED IN:	D.1.2-D.1.4	D.1.5	D.1.1

D.

IDENTIFICATION MATRIX

REQUIRED CHARACTERISTICS FOR STATEMENTS OF OBJECTIVES

CHARACTERISTICS	EXPLICIT	COMPREHENSIVE	FUNCTIONAL
CRITERIA	Statements of objectives must explicitly and objectively identify: • • What the learner is expected to do • • What standards he is expected to meet	Statements of objectives must comprehensively identify: • • The range of inclusiveness of the behavior to be exhibited	Statements of objectives must functionally identify: • • What the learner is expected to be able to perform (criterion behavior) AND • • What the learner will have to learn in order to be able to perform (Sub-criterion and preparatory objectives)

//

NOTE
About the Entire STEP D.1

The Sub-STEPS D.1.2-D.1.5 are not contingent Sub-STEPS; they do not necessarily follow one another in the order presented here. All four, in whatever order, do follow Sub-STEP D.1.1.

Sub-STEPS D.1.2-D.1.5 in their entirety are devoted to procedures for providing a complete *characterization* of criterion behaviors and their constituent sub-criterion and preparatory behaviors. This characterization *supplements* what is described about the criterion behavior in task analysis results. The five Sub-STEPS in STEP D.1 are devoted to the following procedures:

D.1.1 - An identification of the number and types of objectives which will be prepared;

D.1.2 - For *each* criterion objective, an identification of the recall vs. transfer requirements involved;

D.1.3 - A decision about whether or not to make available a performance aid when the criterion behavior is to be exhibited;

D.1.4 - A decision about whether to require performance in one or in two directions; and

D.1.5 - A decision about how much of the criterion behavior to sample.

STEP D.1

D.1 Plan the formulation of objectives for each lesson.

D.1.1 Make decisions about the number of objectives and sub-objectives to develop for a lesson.

D.1.2 Make final decisions about recall/transfer requirements for each objective.

D.1.3 Make decision about availability to students of performance aids.

D.1.4 Make decisions about direction of performance for each objective.

D.1.5 Make decisions about size of sample of performance to be used as evidence of mastery of an objective.

STEP D.1

OVERVIEW

	INPUT	ACTION	OUTPUT
	Sequenced and grouped analysis forms	Review for presence of information relevant to formulation of objectives	Identification of information to be included in statements of objectives

D.1.1	Completed and grouped FORMS: task analysis, learning analysis [A.5(4) or (11)] i	Inspect for type of objectives contained ii	Identification of CRITERION objectives PREPARATORY objectives iii
D.1.2	All separate pages of FORM A.5(4) or FORM A.5(11) associated with each CRITERION objective iv	Inspect preliminary decisions about recall/transfer requirements recorded in COMPETENCY ANALYSES and make final decision v	Final decision about each CRITERION objective: recall vs. transfer requirements vi
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PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*Identification of which behaviors (or components thereof) will be considered criterion, subcriterion, and preparatory objectives.*
WHAT YOU WILL WORK FROM	(1) Grouped forms for task and learning analysis.
WHAT YOU WILL DO	(1) Inspect for types of behavior which can be considered criterion objectives, subcriterion objectives, and preparatory objectives.
FORMS YOU WILL USE	None

DESCRIPTION OF Sub-STEP	D.1.1

INPUT	ACTION	OUTPUT
Completed and grouped FORMS: task analysis, learning analysis [A.5(4) or (11)] i	Inspect for type of objectives contained ii	Identification of --CRITERION objectives --Sub-CRITERION objectives --PREPARATORY objectives iii

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
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Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Grouped analysis forms	C.			

Sub- STEP D.1.1

JOB DIAGRAM

INPUT	ACTION	OUTPUT
Completed and grouped FORMS: task analysis, learning analysis [A.5(4) or (11)] i	Inspect for type of objectives contained ii	Identification of: CRITERION objectives, Sub-CRITERION objectives, and PREPARATORY objectives iii

Self-contained total performance i.a	Identify as a criterion objective ii.a	Identification of a CRITERION objective iii.a
Self-contained part of total performance i.b	Identify as a sub-criterion objective ii.b	Identification of a Sub-CRITERION objective iii.b
NON-self-contained performance component; or not yet learned skill component i.c	Identify as a preparatory objective ii.c	Identification of a PREPARATORY objective iii.c
Already learned skill component; or easily learned skill component i.d	Identify as a NON-objective ii.d	Identification of a NON-objective iii.d

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D.2.2

CRITERIA FOR IDENTIFYING SELF-CONTAINED VS. NOT SELF-CONTAINED BEHAVIOR

IDENTIFICATION MATRIX

TYPE	SELF-CONTAINED BEHAVIOR	NOT SELF-CONTAINED BEHAVIOR
CRITERIA	-A series of performance Sub-STEPS which (although they may be part of longer chain) have an identifiable end point or output at which a performer might naturally stop; -Knowledge domain terminal behaviors (having a chained series of associations) which have their own end points	-A series of performance Sub-STEPS which are contingent; they do not have their own identifiable end point or output at which the performer would naturally stop; rather, they lead directly to other sub-steps in a chain -Component skills in a knowledge domain terminal behavior or in performance sub-step: ••Discriminations ••Generalizations ••Associations
EXAMPLES	e.g., all the sub-steps involved in testing the significance of the difference between the means of two samples; OR even just the sub-steps involved in looking up in a table the statistical significance of a "t" value (which is part of the above behavior) e.g., an essay to identify the pros and cons of population control; OR stating or citing population trends (which can be considered part of the above behavior)	e.g., any one of the several sub-steps involved in threading a film projector, e.g., adjusting the height of the "loop" e.g., a discrimination between "tens" and "hundreds" columns, a component skill in the criterion behavior, "adding columns of numbers"

D.1.1

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING THREE TYPES OF OBJECTIVES: CRITERION, Sub-CRITERION, AND PREPARATORY OBJECTIVES

TYPE OF OBJECTIVES	1. CRITERION OBJECTIVES	2. Sub-CRITERION OBJECTIVES	3. PREPARATORY OR ENABLING OBJECTIVES
CRITERIA	*-Self-contained, total performance* *-The end goal of training or instruction*	*-Self-contained part of the total performance* *-A partial, intermediate goal of training or instruction*	*-NON-self-contained part performance* *-A (learning) goal instrumental in promoting or necessary for an end goal*
	-Their attainment is to be measured by criterion tests either before or at the end of training as an index of student proficiency	*-Their attainment is to be measured by sub-criterion tests either before or at the end of training as an index of student proficiency*	*-Their attainment is to be measured by diagnostic tests either during or after training as an index of weakness of instructional materials*
EXAMPLES	PERFORMANCE	PERFORMANCE	PERFORMANCE
	A total series of contingent tasks (or sub-steps)	One task (or one sub-step) in a series of contingent tasks (Can be more than one, but less than the total number making up the series	
	e.g., *completely threading a film projector*	e.g., *just adjusting the height of loop of film*	e.g., *discriminating between loop heights which are just right, too tall, and too short*
	e.g., *solving a long division problem*	e.g., *estimating how many places in the answer a divisor will require*	e.g., *discriminating between numbers which can and cannot go into another*
	KNOWLEDGE DOMAIN	KNOWLEDGE DOMAIN	KNOWLEDGE DOMAIN
	An end goal terminal behavior	A component of terminal behavior (i.e., a learning goal) to be mastered before end goal can be mastered and exhibited	A component skill to be learned before a Sub-CRITERION behavior can be mastered
	e.g., *state Archimedes' Principle, i.e., "the relationship between 'apparent loss of weight,' weight of overflow of displaced fluid, and magnitude of buoyant force"*	e.g., *define "apparent loss of weight"*	e.g., *discriminating between weight when object is in air and when immersed*
	e.g., *verbally identifying all the characteristics of three types of score distributions which require the use of different types of statistical averages*	e.g., *verbally defining what "skewness" (one property of a distribution) is*	e.g., *discriminating between normal and skewed curve*

D.1.1

CRITERIA FOR IDENTIFYING WHEN COMPONENTS OF A CRITERION OBJECTIVE CAN BE CONSIDERED AS Sub-CRITERION OBJECTIVES (RATHER THAN AS PREPARATORY OBJECTIVES)

IDENTIFICATION MATRIX

TYPE OF OBJECTIVE	Components to be considered as: Sub-CRITERION OBJECTIVES	Components to be considered as: PREPARATORY OBJECTIVES
CRITERIA	*-Components are self-contained; have natural end points (i.e., their outputs can but do not necessarily become an immediate input to the next component)*	*-Components are NOT self-contained; do not have natural end points (i.e., their outputs become the immediate input to the next component and so on until a natural end point is reached*
	•Separate tasks within a total performance which are themselves self-contained	*•(There are probably no examples of this at the task level)*
	•Separate steps within a task which are themselves self-contained	*•Separate steps within a task which do not mark an end point; rather produce an output which becomes an input for the next step*
	•Separate sub-steps within a step which are themselves self-contained	*•Separate sub-steps within a task which do not mark an end point; rather produce an output which becomes an input for the next step*
	*•Components of a knowledge domain terminal behavior judged to be a sub-criterion objective**	*•Components of a knowledge domain terminal behavior not judged to be a sub-criterion objective*

*It is usually a matter of judgment whether a component of a terminal behavior (e.g., a single concept in a principle involving a number of concepts) is to be treated as a criterion objective or as a sub-criterion objective.

EXAMPLES	See page 11

D.1.1

CONTRASTING EXAMPLES OF PERFORMANCE COMPONENTS WHICH SHOULD BE CONSIDERED AS Sub-CRITERION OR AS PREPARATORY OBJECTIVES

EXAMPLES

	POSITIVE EXAMPLES	NEGATIVE EXAMPLES
PERFORMANCE COMPONENTS to be considered as: Sub-CRITERION OBJECTIVES	e.g., test item preparation can be considered as a self-contained step in the overall task of developing and validating a test A population of test items is a natural end point or output	e.g., preparation of test item stems is probably not a good example of a self-contained step; it usually leads directly to the preparation of response options (and only then is the operation self-contained with a natural and complete output) "Writing stems" would probably be considered a preparatory objective
PERFORMANCE COMPONENTS to be considered as: PREPARATORY OBJECTIVES	e.g., discriminating between examples of either "monetary" policy or of "fiscal" policy might be judged as preparatory objectives (preparing the learner to perform as in the righthand column) For some subject matter experts or educators, it, too, might be considered a criterion objective (an outcome instruction is to bring about). The decision is a matter of judgment.	e.g., comparing and contrasting "fiscal" and "monetary" policy is a terminal behavior probably too large in scope to be judged as a preparatory objective, even though another more comprehensive objective calls for relating the effect of both employment and production levels. It would probably be judged a sub-criterion objective

D.1.1

CRITERIA FOR DETERMINING WHICH SKILL COMPONENTS SHOULD AND SHOULD NOT BE IDENTIFIED AS PREPARATORY OBJECTIVES

IDENTIFICATION MATRIX

SKILL COMPONENTS	To be identified as PREPARATORY OBJECTIVES	NOT to be identified as preparatory objectives: NON-Objectives
CRITERIA	*-Any discrimination, generalization, or association in a performance sub-STEP or in a knowledge domain TERMINAL BEHAVIOR* *•Which the trainee has NOT previously acquired (learned); AND* *•Which it is DIFFICULT to acquire*	*-Any discrimination, generalization, or association in a performance sub-STEP or in a knowledge domain TERMINAL BEHAVIOR* *•Which the trainee HAS previously acquired (learned); OR* *•Which it is EASY to acquire*

EXAMPLES

e.g., teacher-trainee learning to "shape" behavior of her students

INPUT	ACTION	OUTPUT
Change in behavior which is an improvement over last reinforced instance	*Provide reinforcement*	*Delivery of reinforcement*
Change in behavior which is NOT an improvement over last reinforced instance	*Withhold reinforcement*	*No delivery of reinforcement*

The teacher trainee has not previously learned to discriminate between what is considered an improvement and what is not; nor has she learned to associate a course of action with each situation. Both should be considered as preparatory objectives.

e.g., driver-trainee learning what to do at "lights"

INPUT	ACTION	OUTPUT
Red light 1a	*Stop* 2a	*Car stopped* 3a
Green light 1b	*Go* 2b	*Car in motion* 3b
Amber light 1c	*Slow down* 2c	*Car slowed down* 3c

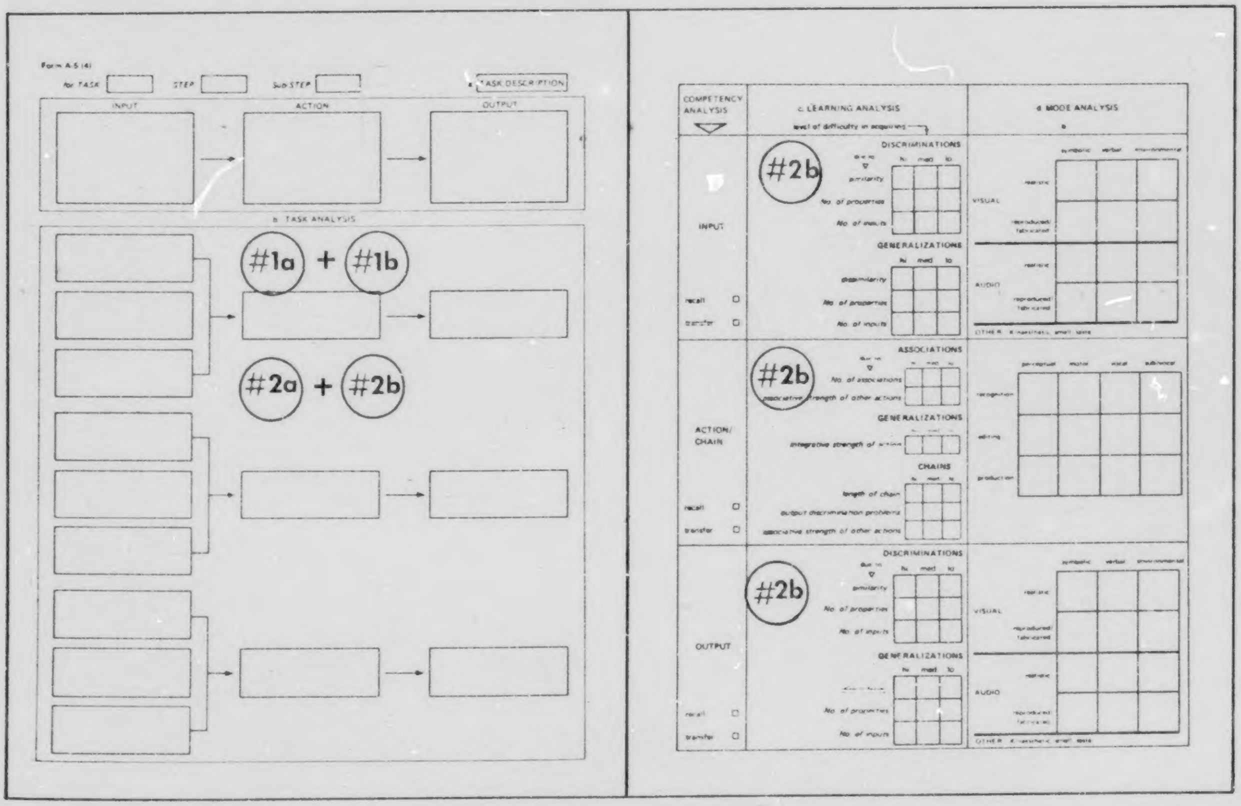
The trainee can already discriminate between colors; this would, therefore, not be a preparatory objective. What he hasn't yet learned to do is to take the right action for each type of light. These associations would constitute a preparatory objective for this learning situation.

D.1.1

ILLUSTRATION SUMMARIZING PROCEDURES IN DECIDING WHAT ARE TO BE CONSIDERED CRITERION AND PREPARATORY OBJECTIVES FOR A LESSON

#1	#2
a. Inspect each grouped set of forms [A.5(4) or A.5(11)] b. Determine within each set components (i.e., tasks, steps, or sub-steps) (i.e., terminal behaviors) which are: •self-contained •not self-contained c. Identify criterion, sub-criterion, and preparatory objectives on the basis of above determination	a. Inspect each individual form [A.5(4) or A.5(11)] b. Determine whether component skills (discriminations, generalizations, or associations) are or are not: •in learner's repertoire, or •difficult to learn c. Identify component skills to be considered as preparatory objectives (and those to be ignored)

FORM A.5(4) or A.5(11)



Form A.5 (4)
for TASK
STEP
Sub STEP
TASK DESCRIPTION
INPUT
ACTION
OUTPUT
b. TASK ANALYSIS
#1a + #1b
#2a + #2b
COMPETENCY ANALYSIS
c. LEARNING ANALYSIS
d. MODE ANALYSIS
DISCRIMINATIONS
#2b
GENERALIZATIONS
INPUT
VISUAL
AUDIO
ASSOCIATIONS
#2b
ACTION/CHAIN
CHAINS
DISCRIMINATIONS
#2b
OUTPUT
GENERALIZATIONS

PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*A final decision about RECALL and TRANSFER requirements following completion of training or instruction.*
WHAT YOU WILL WORK FROM	(1) All the separate task analysis forms associated with each criterion behavior. (2) Endorsements in these forms of recall vs. transfer requirements.
WHAT YOU WILL DO	(1) Make final decisions as to whether Post-training performance will require RECALL or TRANSFER.
FORMS YOU WILL USE	None

DESCRIPTION OF Sub-STEP	D.1.2

INPUT		ACTION		OUTPUT
All separate pages of FORM A.5(4) or FORM A.5(11) associated with each CRITERION objective iv	→	Inspect preliminary decisions about recall/transfer requirements recorded in COMPETENCY ANALYSES and make final decision v	→	Final decision about each CRITERION objective: recall vs. transfer requirements vi

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
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Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Identification of what will be CRITERION objectives	D.1.1			

STEP D.1.2

INPUT	ACTION	OUTPUT
All separate pages of FORM A.5(4) or FORM A.5(11) associated with each CRITERION objective iv	Inspect preliminary decisions about recall/transfer requirements recorded in COMPETENCY ANALYSES and make final decision v	Final decision about each CRITERION objective: recall vs. transfer requirements vi
-INPUTS are specific -INPUTS belong to a class which: •Is small; OR •Contains highly dissimilar members -ACTIONS are specific -ACTIONS belong to a class which: •Has low integrative strength; OR •Contains highly dissimilar members iv.a	Decide to require RECALL v.a	RECALL requirement: All examples will be encountered during instruction vi.a
-INPUTS belong to a class which: •is large; AND •Contains highly similar members -ACTIONS belong to a class which: •Has high integrative strength; OR •Contains similar members iv.b	Decide to require TRANSFER v.b	TRANSFER requirement: Only some examples will be encountered during instruction vi.b

JOB PROCEDURES

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Assessing adequacy of determination of recall/transfer requirements	23

D.1.2

PLANNING WHETHER TO INCLUDE ALL EXAMPLES OF AN INPUT CLASS OR OF AN ACTION CLASS IN TRAINING (THEREBY DETERMINING RECALL OR TRANSFER REQUIREMENTS)

DECISION MATRIX

CONDITIONS	INPUTS -Inputs are specific (i.e., an input constitutes a class of one) -Inputs belong to a class of inputs which: •Is small (i.e., contains no more than several inputs) •Contains highly dissimilar inputs (the class may be large)	INPUTS -Inputs belong to a class of inputs which: •Is large (i.e., includes many inputs), AND •Contains highly similar inputs
	ACTIONS -Actions are specific (i.e., a class of one) -Actions belong to a class which: •Has low integrative strength •Contains dissimilar actions (e.g., different modes of responding)	ACTIONS -Actions belong to a class which: •Has high integrative strength •Contains similar actions (e.g., same mode of responding)
ACTION TO TAKE	*Plan to include all examples in instruction and require RECALL on criterion testing*	*Plan not to include all examples in instruction and require TRANSFER on criterion testing*

D.1.2

EXAMPLES OF SITUATIONS LEADING TO A DECISION TO REQUIRE RECALL VS. TRANSFER FOR INPUTS

EXAMPLE

DECISION	Decision to require RECALL of INPUTS	Decision to require TRANSFER for INPUTS
IMPLICATIONS FOR TRAINING OR INSTRUCTION	Practice will include all examples of INPUTS	Practice will include only some examples of INPUTS
EXAMPLES	-INPUTS are specific: e.g., *a particular brand and a particular model number of audio-tape recorder** If the learner is to learn to use this highly specific piece of equipment (in whatever fashion), he will need to practice using it during training	
	-INPUTS belong to a class which contains a small number of members: e.g., *the class is "singular, relative pronouns in the nominative case"--They are: "who," "which," and "that"* Since the number of members (i.e.. three) is small, all are included in instruction, and their RECALL will be required	-INPUTS belong to a class which contains a large number of members; AND the members are highly similar: e.g., *the class is "liquids"; the class contains many different types of liquids, all of which have to be seen as liquids and all of which have to have the same properties associated with them* Since liquids are highly similar appearing, only some examples need be used in instruction; transfer to remaining members can be expected
	-INPUTS belong to a class (may even be a large class) which contains highly dissimilar appearing members e.g., *the class might be "American novelists" and the learner has to learn to associate basically the same set of literary properties with them* Since the range of "American" novelists is likely to be wide and there may be superficial properties making them appear different, each novelist might have to be covered during instruction and to be covered repeatedly so that the similarity among them can be seen	

**The fact that there may be thousands of actual recorders bearing the same brand name and model number does not make this an INPUT class; the thousands of recorders are identical in configuration, thus making them specific INPUTS. A class of inputs requires some variation among members (e.g., the same brand but differing model number).*

D.1.2

EXAMPLES OF SITUATIONS LEADING TO A DECISION TO REQUIRE RECALL VS. TRANSFER FOR ACTIONS

EXAMPLES

DECISION	Decision to require RECALL of ACTIONS	Decision to require TRANSFER for ACTIONS
IMPLICATIONS FOR TRAINING OR INSTRUCTION	Practice will include all examples of ACTIONS	Practice will include only some examples of ACTIONS
EXAMPLES	-ACTIONS are specific: *e.g., action to be learned is "depressing a typewriter key" appropriate to (associated with) a particular lower case letter* Each keyboard has only one key for each letter. Practice must involve each key, and action RECALL will be required.	
	-ACTIONS belong to a class (of actions) which has low integrative strength: *e.g., verbal composition skills are at low integrative strength* Practice will be required in the varied modes (say, recognition and production) when using language to give explanations in various social science subject matters. Later, RECALL in the various modes will be required.	-ACTIONS belong to a class (of actions) whicn has high integrative strength: *e.g., verbal composition skills are at high integrative strength* Practice will be required in just one mode when using language to give explanations in various social science subject matters. Later, TRANSFER to other modes can be required and be expected to succeed.
	-ACTIONS belong to a class which contains highly dissimilar members *e.g., as evidence of "understanding" Bernoulli's principle, the student is required: (1) to state the principle; (2) to provide an example of its operation* Because these two actions are dissimilar, both should be practiced in instruction and later on RECALLED. To have practiced only one of them and later to require TRANSFER to the other would, in all likelihood, prove too difficult for the student.	-ACTIONS belong to a class which contains highly similar members *e.g., as evidence of "understanding" Bernoulli's principle, the student is required: (1) to indicate in response to a single example presented him whether it is a case of Bernoulli's principle; and (2) to indicate in response to several examples which represents Bernoulli's principle* The types of action are so similar practice with one can be expected to lead to TRANSFER to the other.

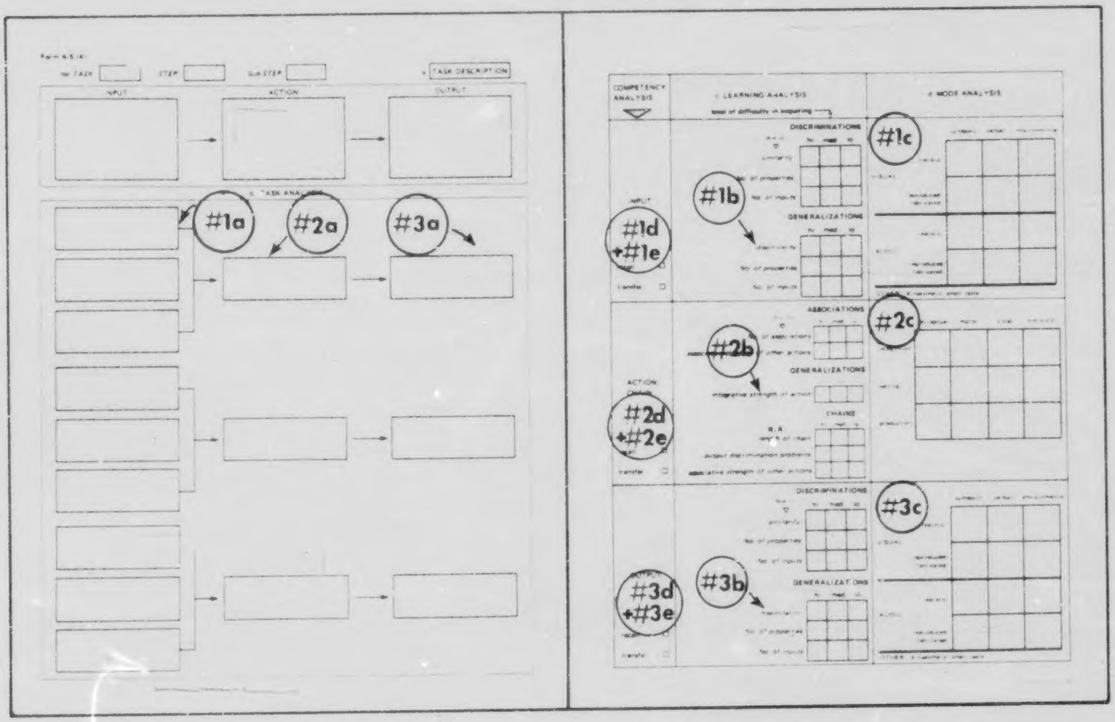
D.1.2

ILLUSTRATION SUMMARIZING PROCEDURES INVOLVED IN MAKING FINAL DECISION ABOUT RECALL/TRANSFER REQUIREMENTS FOR EACH CRITERION OBJECTIVE IN A LESSON

COLLECT ALL ANALYSIS FORMS [A.5(4) or (11)] FOR EACH CRITERION OBJECTIVE.

#1	#2	#3
INSPECT INFORMATION ABOUT INPUTS	INSPECT INFORMATION ABOUT ACTIONS	INSPECT INFORMATION ABOUT OUTPUTS
a. Task analysis diagrams	a. Task analysis diagrams	a. Task analysis diagrams
b. Learning analysis results (sources of potential generalization difficulties concerning INPUTS)	b. Learning analysis results (sources of potential generalization difficulties concerning ACTIONS)	b. Learning analysis results (sources of potential generalization difficulties concerning OUTPUTS)
c. Mode analysis results for sources of dissimilarity	c. Mode analysis results for sources of dissimilarity	c. Mode analysis results for sources of dissimilarity
d. Preliminary competency analysis	d. Preliminary competency analysis	d. Preliminary competency analysis
e. MAKE AND RECORD FINAL DECISION ABOUT RECALL/TRANSFER	e. MAKE AND RECORD FINAL DECISION ABOUT RECALL/TRANSFER	e. MAKE AND RECORD FINAL DECISION ABOUT RECALL/TRANSFER

FORM A.5(4) or (11)


TASK DESCRIPTION
INPUT
ACTION
OUTPUT
TASK ANALYSIS
#1a
#2a
#3a
COMPETENCY ANALYSIS
LEARNING ANALYSIS
MODE ANALYSIS
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
CHAINS
INPUT
ACTION
#1b
#1c
#1d
+#1e
#2b
#2c
#2d
+#2e
#3b
#3c
#3d
+#3e
transfer

D.1.2

CRITERIA FOR ASSESSING THE ADEQUACY OF FINAL DETERMINATION OF RECALL/TRANSFER REQUIREMENTS

STANDARDS
MATRIX

PROPERTIES	COMPLETENESS I	COMPLETENESS II
CRITERIA	*Record of decision concerning RECALL/TRANSFER* *for each and every FORM relevant to a given CRITERION objective*	*Record of decision concerning RECALL/TRANSFER* *on each FORM for* *INPUTS* *ACTIONS* *OUTPUTS*

PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*A decision whether to provide performance aids which the student can use when tested for the criterion behavior or when he is expected to exhibit the criterion behavior following completion of training or instruction without such aid.*
WHAT YOU WILL WORK FROM	(1) Task descriptions appearing as all analysis pages associated with each criterion objective. (2) Learning analysis results.
WHAT YOU WILL DO	(1) Review for characteristics indicating the need or desirability of providing aid to the performance or exhibition of the criterion behavior. (2) Decide whether to provide performance aids.
FORMS YOU WILL USE	None

DESCRIPTION OF Sub-STEP	D.1.3

INPUT		ACTION		OUTPUT
TASK DESCRIPTION information on all pages of FORM A.5(4) or (11) relevant to each criterion objective PLUS analysis results vii	→	Review for evidence of need or desirability to include performance aids in a statement of objectives viii	→	Decision whether to or whether not to include performance aid in a statement of objectives ix

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: What is performance with and without aids 28	-MATRIX: Deciding when to use performance aids 30	-MATRIX: Adequacy of decision process 33	SUMMARY OF PROCEDURES . . 32

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Final recall/transfer decisions	D.1.2	FORM A.5(4) or (11)	D.1.2	

Sub-STEP D.1.3

JOB DIAGRAM

INPUT	ACTION	OUTPUT
TASK DESCRIPTION information on all pages of FORM A.5(4) or (11) relevant to each criterion objective PLUS analysis results vii	Review for evidence of need or desirability to include performance aids in a statement of objectives viii	Decision whether to or whether not to include performance aid in a statement of objectives ix

		DECISION
By definition of job expert or of subject matter expert, criterion behavior requires a performance aid vii.a	Decide to include use of aids in a statement of objectives viii.a	USE performance aids ix.a
By definition of job expert or of subject matter expert, criterion behavior requires there be NO performance aid vii.b	Decide NOT to include use of aids in a statement of objectives viii.b	Do NOT use performance aids ix.b
Use of performance aid is optional and criterion behavior: • Is complex • Is difficult to learn • Is repeatedly changing • Requires costly training • Can use aids without loss of efficiency vii.c	Decide to include use of aids in a statement of objectives viii.c	USE performance aids ix.c
Use of performance aid is optional and criterion behavior: • Is not complex • Is easy to learn • Is unchanging • Does not require costly training • Cannot use aids without loss of efficiency vii.d	Decide NOT to include use of aids in a statement of objectives viii.d	Do NOT use performance aids ix.d

JOB PROCEDURES

	page
Role of performance aids	28
When to provide performance aids	30
SUMMARY OF PROCEDURES	32
Assessing adequacy of decisions about performance aids	33

D.1.3

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING CRITERION BEHAVIOR PERFORMED WITH AND WITHOUT AIDS

TYPE OF PERFORMANCE	Performance of criterion behavior WITH aids available	Performance of criterion behavior WITHOUT aids available
CRITERIA	*-Criterion behavior may have or may NOT have been previously learned:* *(1) Criterion behavior HAS been previously learned; i.e., discriminations, generalizations, associations, and chains have been learned.* *At the end of training or instruction, aids facilitate:* *••Input RECALL or TRANSFER* *••Action RECALL or TRANSFER* *In turn, facilitating discriminations, generalizations, associations, or chains* *OR* *(2) Criterion behavior has NOT been previously learned; i.e., discriminations, generalizations, associations, and chains have NOT been learned.* *At the end of training or instruction, aids directly facilitate:* *••Discriminations,* *••Generalizations,* *••Associations, or* *••Chains*	*-Criterion behavior must have been previously practiced and learned; at the end of training or instruction, performance of criterion behavior depends on:* *••Unassisted input RECALL or TRANSFER* *••Unassisted action RECALL or TRANSFER* *In turn, allowing correct discriminations, generalizations, or chains*
EXAMPLES	See opposite page	

D.1.3

EXAMPLES ILLUSTRATING HOW AIDS FACILITATE PERFORMANCE OF CRITERION BEHAVIOR

EXAMPLES

TYPE OF CRITERION SITUATION	Performance of criterion behavior •Criterion behavior previously learned •No aids available	Performance of criterion behavior •Criterion behavior previously learned •Aids available	Performance of criterion behavior •Criterion behavior NOT previously learned •Aids available
e.g., translating from French to English	-A particular French word has been encountered -The translator must rely on: (a) unaided RECALL of the input (a French word) in order to discriminate it from other inputs; AND (b) unaided RECALL of the action (saying or writing the English equivalent) in order to produce the English equivalent associated with it	-A particular French word has been encountered -The translator can use a dictionary: (a) to facilitate RECALL of the input (a French word) in order to discriminate it from other inputs; OR (b) to facilitate RECALL of the action (saying or writing the English equivalent) in order to produce the English equivalent associated with it	-A particular French word has NOT been encountered -The translator must use a dictionary: (a) to assist him to discriminate the input (a French word) from other (possibly similar) words; AND (b) to assist him to produce the action (English equivalent) associated with it
e.g., computing the appropriate type of average for the type of distribution of scores obtained	-Examples of the distribution similar to the one now obtained were encountered in training -The present example was itself not encountered -The statistician must rely on: (a) unaided input TRANSFER, generalizing from examples previously encountered to the new example now presented to him and discriminating between this input (type of distribution) and other types; AND (b) unaided action RECALL to be able to produce the decision (action) as to the type of average associated with the type of distribution he has obtained	-Examples of the distribution similar to the one now obtained were encountered in training -The present example was itself not encountered -The statistician can use a statistics manual: (a) to facilitate input TRANSFER, generalizing from examples previously encountered to the new example now presented to him and discriminating between this input (type of distribution) and other types; AND (b) to facilitate action RECALL, to be able to produce the decision (action) as to the type of average associated with the type of distribution he has obtained	-No examples of the particular distribution were previously encountered -Other types of distribution were encountered -The statistician must use a statistics manual: (a) to assist him to discriminate between the type of distribution he has obtained and other types; AND (b) to assist him to associate the appropriate type of average to use for the distribution

D.1.3

DECISION MATRIX

DETERMINING WHEN TO DECIDE TO USE PERFORMANCE AIDS

CONDITIONS	JOBS -Aids are built into the job by definition of job experts SUBJECT MATTER -Subject matter specialists define (or judge it desirable) criterion behavior as having aids available	For either JOBS or SUBJECT MATTER which neither rules in nor rules out performance aids AND CRITERION BEHAVIOR ••Is complex ••Is difficult to learn ••Is costly to train for and aids can reduce costs ••Can be performed without loss of efficiency or without added time requirements if aids are used ••Is constantly changing ••Can be acquired to progressively higher proficiency levels on the job with use of aids (i.e., makes it easier to use on-the-job experience as a training measure	JOBS -By definition of job experts aids are not to be made available SUBJECT MATTER -Subject matter specialists define (or judge it desirable) criterion behavior as NOT having aids available
ACTION TO TAKE	*PLAN to use aids*	*CONSIDER use of aids* See opposite page for examples	*Do NOT plan to use aids*

D.1.3

CONTRASTING EXAMPLES OF SITUATIONS IN WHICH THE USE OF AIDS WOULD AND WOULD NOT BE CONSIDERED

EXAMPLES

LIKELIHOOD OF USING AIDS	MORE likely to be considered	LESS likely to be considered
EXAMPLES	*e.g., use of this HANDBOOK in developing instructional materials (on-the-job)* The handbook serves as a guide to performance as a developer gains more on-the-job experience in developing instructional materials. As he becomes more and more proficient, he can rely on the HANDBOOK less and less and use only those portions he requires. Since the criterion behavior (developing materials) is complex and difficult to learn, the HANDBOOK aids recall and transfer. *e.g., use of a checklist by users of equipment (say, an airplane) to check out its fixtures or readiness for operation* When the number of separate behaviors involved in check-out operations is very large, a checklist aids recall; it probably also reduces training time and costs requirements; it would require considerably more practice for the performer to be able to do complete check-outs from memory.	*e.g., use of a manual by a clerk using a desk calculator* The criterion behaviors are relatively non-complex and can be learned to proficiency in a relatively short time. The use of a guide on the job--on a routine basis--would result in inefficiency and high costs. *e.g., use of a manual by an automobile driver during operation of a car* The obvious safety hazard would preclude the use of a performance aid while driving. *e.g., use of a dictionary by an on-the-spot translator of speeches* This kind of translation requires quicker performance and hence a higher degree of prior training rather than reliance on aids during performance. On-the-job experience is not the way to provide this kind of proficiency.

D.1.3 ILLUSTRATION SUMMARIZING PROCEDURES IN MAKING DECISIONS ABOUT AVAILABILITY TO STUDENTS OF PERFORMANCE AIDS

#1

a. Review data about availability of performance aids in TASK DESCRIPTION section of FORM A.5(4) or FORM A.5(11)

on __all__ forms relevant to __each__ criterion objective

WHEN OPTION TO USE PERFORMANCE AIDS IS OPEN

b. Review data about learning difficulty

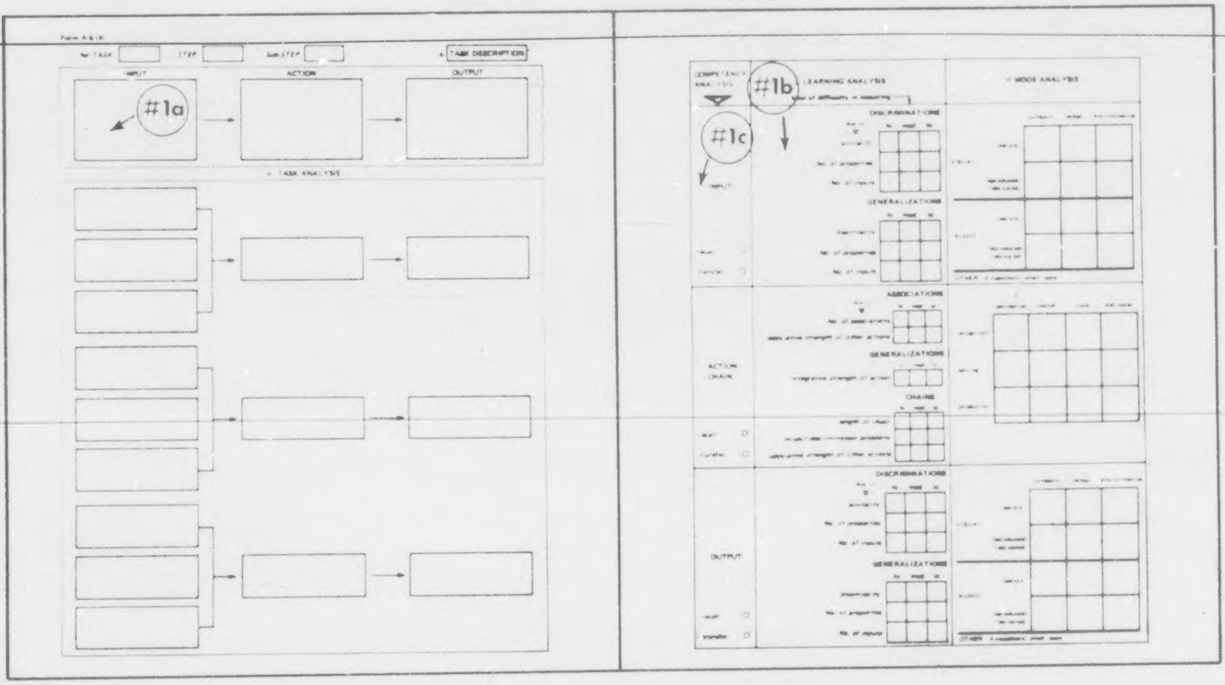
c. Review recall/transfer decisions

#2

a. Consult with job expert or subject matter expert if available

b. Decide whether to include the availability of performance aids in a statement of objectives for each criterion objective

FORM A.5(4) or A.5(11)


TASK DESCRIPTION
INPUT
ACTION
OUTPUT
#1a
TASK ANALYSIS
COMPETENCY ANALYSIS
#1b
LEARNING ANALYSIS
MODE ANALYSIS
#1c
INPUT
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
ACTION CHAIN
CHAINS
OUTPUT
DISCRIMINATIONS
GENERALIZATIONS

D.1.3

STANDARDS MATRIX

CRITERIA FOR ASSESSING THE ADEQUACY OF THE DECISION AS TO WHETHER PERFORMANCE AIDS SHOULD BE PROVIDED (AND THEREFORE INCLUDED IN A STATEMENT OF OBJECTIVES)

TO BE ACCOMPLISHED	A DECISION as to the use of performance aids	An IDENTIFICATION of the training role it will play
CRITERIA	*-For each criterion objective* *··A YES/NO decision*	*-For each criterion objective an identification of "for what" assistance will be provided:* *··Recall/transfer* *··Discriminations, generalizations, associations, or chains*

PREVIEW OF THE NEXT SubSTEP

<table>
<tr><td>YOUR PRODUCT</td><td>A decision as to whether to require the ability to perform in two directions:
<table>
<tr><th>GIVEN</th><th>STUDENT WILL PRODUCE</th></tr>
<tr><td>(1) INPUT</td><td>ACTION</td></tr>
<tr><td>(2) ACTION</td><td>INPUT</td></tr>
</table></td></tr>
<tr><td>WHAT YOU WILL WORK FROM</td><td>(1) Task description.
(2) Learning analysis results.</td></tr>
<tr><td>WHAT YOU WILL DO</td><td>(1) Review for requirements of performance requiring forward and reverse directions.
(2) Decide whether to specify two directions in a statement of objectives.</td></tr>
<tr><td>FORMS YOU WILL USE</td><td>None</td></tr>
</table>

DESCRIPTION OF Sub-STEP	D.1.4

INPUT		ACTION		OUTPUT
Task description + learning analysis results x	→	Review for requirements of forward and/or reverse performance directions xi	→	Decision about performance direction(s) to be reflected in a statement of objectives xii

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: Forward and reverse performance directions . . . 38 -MATRIX: Situations likely to require one or two directions . . . 39	-MATRIX: When to plan for more than one direction 41	-MATRIX: Adequacy of decision about performance direction(s) . . . 43	SUMMARY OF PROCEDURES . . . 42

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
		FORM A.5(4) or (11)	D.1.3	

Sub-STEP D.1.4

JOB DIAGRAM

INPUT	ACTION	OUTPUT
Task description + learning analysis results x	Review for requirements of forward and/or reverse performance directions xi	Decision about performance direction(s) to be reflected in a statement of objectives xii

		DECISION
Task description requirements regarding performance direction for CRITERION and Sub-CRITERION objectives x.a	Plan to reflect direction requirements in statement of objectives xi.a	Direction as per task description requirements xii.a
Learning analysis results: Potential difficulties for PREPARATORY objectives x.b	Identify difficulties and plan two performance directions xi.b	Strong consideration for: forward AND reverse directions xii.b
Learning analysis results: NO potential difficulties for PREPARATORY objectives x.c	Plan possible consideration of more than one direction xi.c	Weak consideration for: forward AND reverse directions xii.c

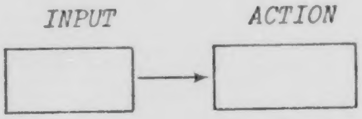
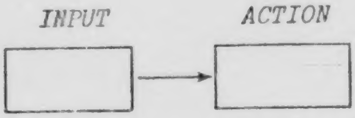
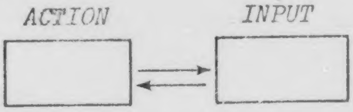
JOB PROCEDURES

	page
When "forward" and "reverse" performance directions are likely to be required	39
Determining whether to require both "forward" and "reverse" performance directions	41
SUMMARY OF PROCEDURES	42
Assessing decisions about direction of performance	43

D.1.4

CRITERIA FOR IDENTIFYING TWO TYPES OF REQUIREMENTS IN DIRECTION OF CRITERION BEHAVIOR

IDENTIFICATION MATRIX

DIRECTION REQUIREMENTS	ONE DIRECTION (only): FORWARD	TWO DIRECTIONS: FORWARD and REVERSE
CRITERIA	*-On a test the student is given: the INPUT and must produce: the associated ACTION* 	*-On a test the student is given: the INPUT and must produce: the associated ACTION*  *-On a test the student is given: the ACTION and must produce: the associated INPUT* 
IMPLICATIONS FOR THE TRAINING DEVELOPMENT PROCESS	The student will only be tested in this one direction; and therefore needs to be trained for (i.e., practice on) that one direction.	The student will be tested in both directions; and therefore needs to be trained for (i.e., practice on) both directions

	Student is given the INPUT: *one of the personal pronouns: "he," "she," or "it."* Student must produce the ACTION: *the present tense of "to be": "is"*	Student is given the INPUT: *one of the personal pronouns: "he," "she," or "it."* Student must produce the ACTION: *the present tense of "to be": "is."*
		The student is given the ACTION: *the present tense of "to be": "is."* Student must produce the INPUT: *any third person singular personal pronoun, "he," "she," or "it."*

D.1.4

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING SITUATIONS IN WHICH OBJECTIVES ARE LIKELY TO REQUIRE ONE VS. TWO DIRECTIONS*

REQUIREMENTS	1 ONE direction (FORWARD) likely to be required	2 Either ONE or TWO directions (FORWARD OR REVERSE) possible	3 TWO directions (FORWARD AND REVERSE) likely to be required
CRITERIA	*-Criterion behavior and, hence, the criterion objective involves:* *·Performance on the job*	*-Criterion behavior and, hence, the criterion objective involves:* *·Performance in subject matter area* *·Knowledge domain terminal behavior in subject matter area*	*-Preparatory objectives involve:* *·Performance, either on the job or in subject matter area* *·Knowledge domain terminal behavior*
*The requirement of two directions, in column 2 or 3, is based on judgment which is exercised by the technologist and/or the subject matter or job expert.			
EXAMPLES	See page 40		

D.1.4

EXAMPLES ILLUSTRATING SITUATIONS IN WHICH OBJECTIVES WILL REQUIRE FORWARD, REVERSE, OR BOTH DIRECTIONS

EXAMPLES

	ON-THE-JOB PERFORMANCE e.g., teacher-trainee learning to use a "shaping" routine (i.e., reinforcing gradually improving approximations in student behavior)	PERFORMANCE IN SUBJECT-MATTER AREA e.g., geography student learning to locate cities on a map	See MATRIX on page 41 for further criteria and for examples
EXAMPLES	*In a test situation the teacher is likely to be GIVEN as INPUTS examples of student behavior eligible for or ineligible for reinforcement; and* *the teacher is likely to be required to PRODUCE the ACTION: delivering or not delivering reinforcement* The reverse (being asked to identify what conditions would be eligible or ineligible for reinforcement) is not likely to be required, because it is not the direction of the actual performance. The forward direction is the suitable criterion objective.	*The student may be given as an INPUT a dot on a map and be required to name the city it represents (ACTION); AND/OR the reverse may be required; i.e., given the name of the city, he has to put a dot on the map* Both directions are suitable criterion objectives and both may be required. KNOWLEDGE DOMAIN TERMINAL BEHAVIOR e.g., math student is to identify technical terms *Given the term "prime number" as the INPUT, the student has to define it or give an example (ACTION); OR given the definition as INPUT (or given an example as INPUT), he has to produce the term "prime number" as ACTION.* Since both are suitable criterion objectives, both may be required.	

D.1.4

DECISION
MATRIX

DETERMINING WHETHER TO PLAN FOR (AND INCLUDE IN A STATEMENT OF OBJECTIVES) TWO PERFORMANCE DIRECTIONS

CONDITIONS	-Job expert or subject matter expert indicates that learner population tends to make errors in component skills (i.e., discriminations, generalizations, associations, or chains) involved in preparatory behavior (i.e., sub-objectives) -Learning analysis reveals potential learning difficulties regarding component skills	-Job expert or subject matter expert indicates that learner population tends NOT to make errors in component skills (i.e., discriminations, generalizations, associations, or chains) involved in preparatory behavior (i.e., sub-objectives) -Learning analysis reveals NO potential learning difficulties regarding component skills
ACTION TO TAKE	*Give strong consideration to:* *(a) Providing practice in two directions (i.e., thus becoming a sub-objective)* *(b) Creating test items in two directions as a diagnostic measure*	*Make no explicit plans to (but still consider the possibility of):* *(a) Providing practice in two directions (i.e., thus becoming a sub-objective)* *(b) Creating test items in two directions as a diagnostic measure*
	INCLUDE IN A STATEMENT OF OBJECTIVES	DO NOT INCLUDE IN A STATEMENT OF OBJECTIVES
EXAMPLES	*e.g., the performer has to learn to associate (for identifying the resistance values of color-coded resistors) ten different colors and their associated values* This is a difficult association problem; strong consideration may be given to two performance directions (both in practice and testing): *i.e., given a color, produce the number (as in the criterion behavior) AND* *given a number, produce or identify the associated color.*	*e.g., the driver-trainee has to learn to associate (in reacting to traffic signals) three types of lights and three actions (stop, go, slow down)* This is not a difficult association problem; little consideration would be given to practice or testing in two directions. The only direction to be considered and recorded in a statement of objectives would be: *light → driving action*

D.1.4

ILLUSTRATION SUMMARIZING PROCEDURES INVOLVED IN PLANNING WHETHER TO INCLUDE MORE THAN ONE DIRECTION IN A STATEMENT OF OBJECTIVES

#1

For CRITERION objectives

a. Review task description information for requirements by job or subject matter experts of forward/reverse performance directions

b. Plan to include in statement of objectives direction(s) so identified

#2

For PREPARATORY objectives

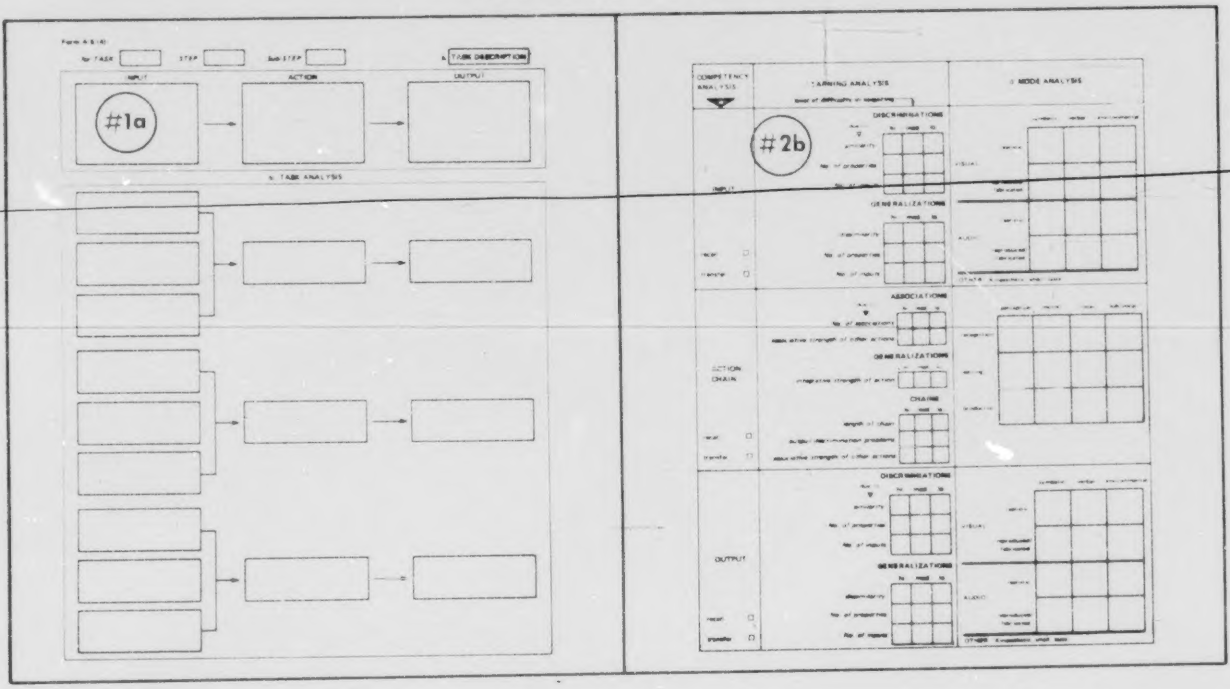
a. Review learning analysis information for potential learning difficulties or error-prone situations

b. Consider use of forward and reverse directions for learning situations involving potential difficulties--both in:

- ··Practice situations, and
- ··Diagnostic testing

c. Plan (when appropriate) to include in a statement of objectives

FORM A.5(4) or A.5(11)



D.1.4

STANDARDS
MATRIX

CRITERIA FOR ASSESSING THE ADEQUACY OF THE DECISION ABOUT DIRECTION OF PERFORMANCE TO REQUIRE (AND THEREFORE TO INCLUDE IN A STATEMENT OF OBJECTIVES)

TO BE ACCOMPLISHED	A DECISION as to the number of directions to be required for CRITERION OBJECTIVES	A DECISION as to the number of directions to be required for PREPARATORY OBJECTIVES
CRITERIA	*-For each criterion objective:* *·A yes/no decision* *·Based on judgment of subject matter experts or of job experts as to desired requirements*	*-For each preparatory objective:* *·A yes/no decision* *·Based on identification of:* *··Known error-prone learning situations* *··Learning analysis difficulties*

PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*Plans which identify how many members of classes (INPUTS, ACTIONS, or OUTPUTS) to be represented in statement of objectives.*
WHAT YOU WILL WORK FROM	(1) Task analysis results (2) RECALL/TRANSFER decisions (3) Learning analysis results
WHAT YOU WILL DO	(1) Review classes of INPUTS, ACTIONS, or OUTPUTS for: ... number of members of the class ... similarity/dissimilarity of members (2) Based on this review decide how many members of the classes to identify individually in statements of objectives.
FORMS YOU WILL USE	None

DESCRIPTION OF Sub-STEP	D.1.5

INPUT	ACTION	OUTPUT
Completed task analysis FORMS: A.5(4) or (11) + RECALL/TRANSFER decisions + learning analysis results xiii	→ Determine how much of criterion behavior should be represented in a statement of objectives xiv →	Plan to represent: -All classes of inputs and actions -All members within a class to be recalled -Some members within a class requiring transfer xv

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: Size of input and action classes . . . . 48 -MATRIX: Post-instructional performance requirements . . 49 -MATRIX: Effect of similarity on recall/transfer requirements . . 50	-MATRIX: How much of criterion behavior to represent in objectives . . 52	-MATRIX: Adequacy of planning the representation of criterion behavior 54	SUMMARY OF PROCEDURES 53

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Final recall/transfer decisions	D.1.2	FORM A.5(4) or (11) carried forward from	D.1.4	

Sub-STEP D.1.5

JOB DIAGRAM

INPUT	ACTION	OUTPUT
Completed task analysis FORMS: A.5(4) or (11) + RECALL/TRANSFER decisions + learning analysis results xiii	Determine how much of criterion behavior should be represented in a statement of objectives xiv	Plan to represent: -All classes of inputs and actions -All members within a class to be recalled -Some members within a class requiring transfer xv
Two or more classes of inputs, actions, or outputs (either requiring recall OR transfer) xiii.a	Plan to represent: Each and every class xiv.a	Statement of objectives identifies: Each class xv.a
Within a class: All members must be RECALLED xiii.b	Plan to represent: All members within the class xiv.b	Statement of objectives identifies: All members within a class xv.b
Within a class: •Members are dissimilar •Transfer is required xiii.c	Plan to represent: A relatively large number of members within the class xiv.c	Statement of objectives identifies: Large number of examples to be encountered in instruction xv.c
Within a class: •Members are similar •Transfer is required xiv.d	Plan to represent: A relatively small number of members within the class xiv.d	Statement of objectives identifies: Small number of examples to be encountered in instruction xv.d

BACKGROUND INFORMATION

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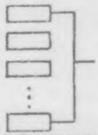
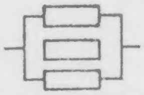
What is meant by the size of a class of inputs or a class of actions	48
Performance requirements as a function of how much of a class is encountered in training	49
What to include in training as a function of similarity among members of a class	50

D.1.5

CRITERIA FOR IDENTIFYING THE LIKELY SIZE OF CLASSES OF INPUTS AND OF CLASSES OF ACTIONS

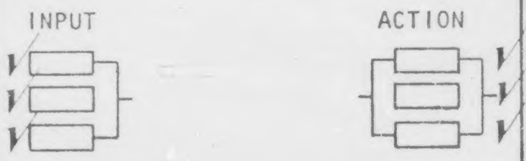
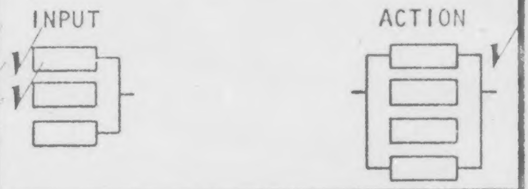
IDENTIFICATION MATRIX

TYPE OF CLASS	INPUT class	ACTION class
	INPUT ACTION OUTPUT	INPUT ACTION OUTPUT
DIAGRAM		
CRITERIA	*-The population of member inputs belonging to a given class of inputs may range from:* *•One input (a specific input) to* *•Virtually infinity* *-The population of input members belonging to an input class is likely to be LARGER than the population of action members belonging to an action class*	*-The population of member actions belonging to a given class of actions is likely to range from:* *•One action to* *•Several* *-The population of action members belonging to an action class is likely to be SMALLER than the population of input members belonging to an input class*
EXAMPLES	e.g., the class of inputs is: *"third person, singular pronouns." There are but three members: "he," "she," and "it."* e.g., the class of inputs is: *"cities"* There are for all practical purposes an infinite number of members belonging to this class: *Milan, London, Hartford, etc.*	e.g., the class of actions is: *"types from copy"* There is only one member to this class. *There is only one way to type* e.g., The class of actions is: *"identifies the characteristics of a 'trapdoor spider'"* There are a number of member actions belonging to this class. *i.e., there are a number of different ways to make the identification:* *Pick out an example from a variety of types of spiders* *List the characteristics of the spider* *Draw a sketch of the spider* The number of ways, however, tends to be limited.

D.1.5

CRITERIA FOR IDENTIFYING VARIATIONS IN POST-INSTRUCTIONAL PERFORMANCE REQUIREMENTS DEPENDING ON WHAT IS ENCOUNTERED IN TRAINING

IDENTIFICATION MATRIX

WHAT IS ENCOUNTERED IN TRAINING	All members of a class are encountered in training (marked by √'s below)	Only some members of a class are encountered in training (marked by √'s below)
DIAGRAMS		
CRITERIA	*-Post-instructional criterion behavior involving any input member or any action member will depend on:* *RECALL*	*-Post-instructional criterion behavior involving only those input members or action members which were encountered in instruction or training will require RECALL* *-Post-instructional criterion behavior involving those input members or action members NOT encountered in instruction or training will depend on:* *TRANSFER*

EXAMPLES	e.g., *the names of three types of means (as inputs)* *are all encountered in instruction: mean, median, mode* Post-instructional criterion behavior will require their RECALL	e.g., *some examples of "solids" (as inputs)* *are encountered in instruction: gold, wood, copper, steel* Post-instructional criterion behavior involving these very examples will require RECALL Post-instructional criterion behavior involving other examples: *aluminum, tin, rock, etc.*, will require transfer

D.1.5

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING SITUATIONS IN WHICH SIMILARITY/DISSIMILARITY AMONG MEMBERS WITHIN THE SAME CLASS ARE LIKELY TO DETERMINE WHETHER THEY ARE PRESENTED DURING INSTRUCTION AND CONSEQUENTLY WHETHER RECALL OR TRANSFER WILL BE REQUIRED

LIKELY RECALL/TRANSFER REQUIREMENTS	ALL members of the class are likely to be presented during instruction, and subsequent criterion behavior will depend on RECALL when ▽	MANY members of the class are likely to be presented during instruction, and subsequent criterion behavior will require: -RECALL of these many members -TRANSFER to the remainder when ▽	Only a FEW members of the class are likely to be presented during instruction, and subsequent criterion will require: -RECALL of these few members -TRANSFER to all other members when ▽
CRITERIA	*-Members within the class are highly dissimilar*	*-Members within the class are moderately dissimilar*	*-Members within the class are highly similar*
EXAMPLES	e.g., the class of inputs is: *"reptiles"* The members of this class which should be seen as similar tend to be highly dissimilar appearing (although by definition they share common properties) *turtles, lizards, snakes, crocodiles, and alligators* All members of the class *i.e., turtles, lizards, snakes, etc.,* are likely to be presented during instruction. Post-instructional criterion behavior will involve RECALL	e.g., the class of inputs is: *"the grasshopper order"* Since the members of the class tend to be moderately dissimilar, *(It includes: grasshopper, cricket, praying mantis, katydid, walking stick, locust, cockroach)* but need to be seen as similar (i.e., possessing the same properties that define the class) e.g., *hard jaws which move from side to side, two pairs of wings, etc.* Many members are likely to be presented during instruction.	e.g., the class of inputs is: *"plural nouns with an 's' ending"* The members of the class are highly similar and relatively few need be presented during instruction. RECALL of these *(seen as plurals)* and TRANSFER to the remainder *(seen as plurals)* will be required

JOB PROCEDURES

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D.1.5

DECISION
MATRIX

DETERMINING HOW MUCH OF A SAMPLE OF THE TOTAL CRITERION BEHAVIOR SHOULD BE REPRESENTED IN A STATEMENT OF OBJECTIVES

CONDITIONS (Determined in earlier sub-steps)	-There are two or more classes (inputs, actions, outputs) -Requirements can be either recall or transfer	-Within a given class all members must be RECALLED	-Within a given class: •Members are dissimilar •Transfer is required	-Within a given class: •Members are similar •Transfer is required
ACTION TO TAKE	*Plan to represent in a statement of objectives each and every class*	*Plan to represent in a statement of objectives all members belonging to the class*	*Plan to represent the class more heavily in a statement of objectives the more dissimilarity among members there is*	*Plan to represent the class less heavily in a statement of objectives the more similarity among members there is*
EXAMPLES	The classes are: *first, second, and third person personal pronouns (as inputs)* A statement of objectives should represent each of the three classes. e.g., *given an example of a personal pronoun in either the first, second, or third person, the learner will, etc.*	The class is: *third person personal pronouns: "he," "she," and "it" (as inputs)* A statement of objectives should represent all members of the class. e.g., *given any of the third person singular personal pronouns ("he," "she," or "it"), the learner will, etc.*	The class is: *plural nouns: ending in "s," "es," and irregulars* A statement of objectives should represent a relatively large sample of the class. e.g., *given any of as many as a dozen examples of regular and irregular plurals, the learner will, etc.*	The class is: *plural nouns ending in "s"* A statement of objectives should represent a relatively small sample of the class. e.g., *given any of up to a half dozen plural nouns ending in "s" (none of which was encountered in instruction), the learner will, etc.*

D.1.5

ILLUSTRATION SUMMARIZING PROCEDURES FOR DECIDING ABOUT HOW MUCH OF THE CRITERION BEHAVIOR TO REPRESENT IN A STATEMENT OF OBJECTIVES

#1

For INPUTS

a. Inspect task analysis FORM A.5(4) or (11) for:
   - (1) Number of input classes
   - (2) Number of members in each class
   - (3) Indication of dissimilarity among members within a class
   - (4) Recall/transfer requirements

b. Make plans about what to represent in statement of objectives

#2

For ACTIONS

a. Inspect task analysis FORM A.5(4) or (11) and FORM A.5(7) for:
   - (1) Number of members in each action class
   - (2) Recall/transfer requirements

b. Make plans about what to represent in statement of objectives

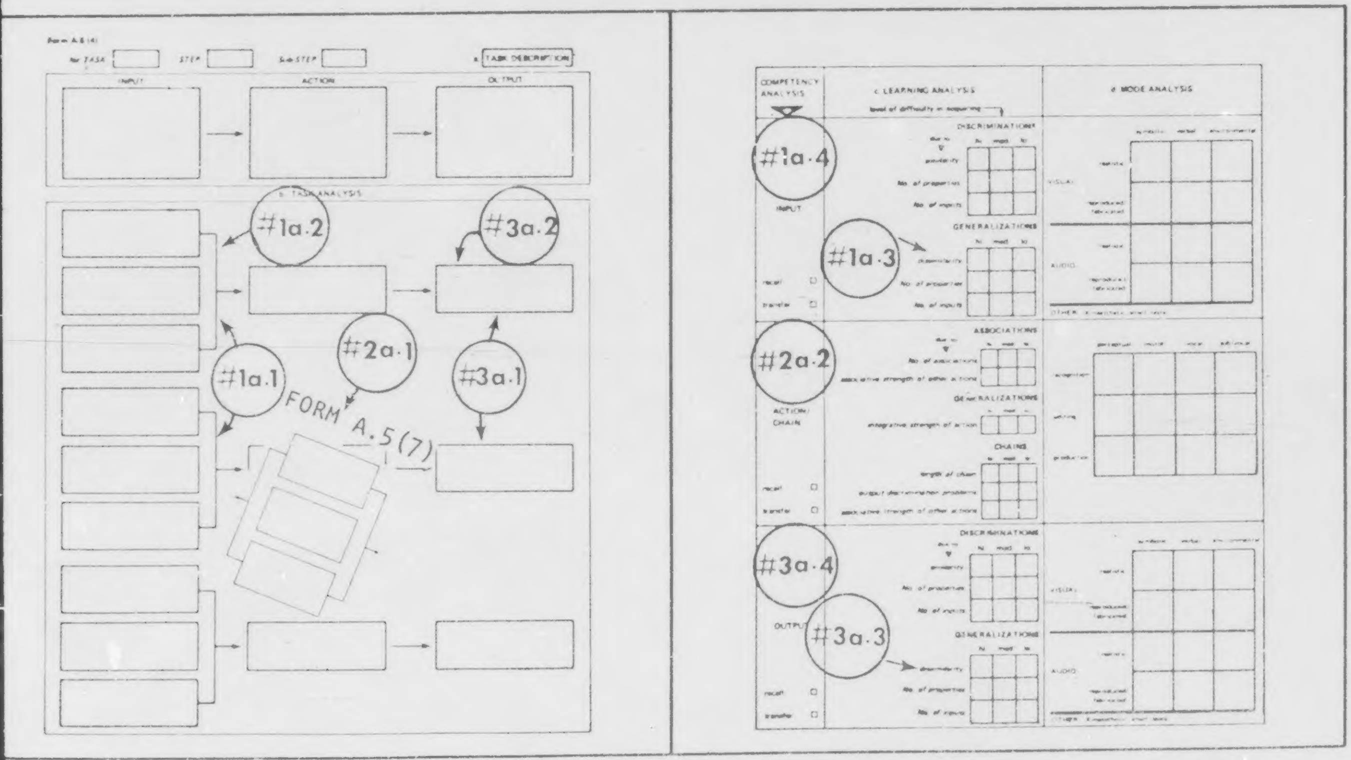
#3

For OUTPUTS

a. Inspect task analysis FORM A.5(4) or (11) for:
   - (1) Number of output classes
   - (2) Number of members in each class
   - (3) Indication of dissimilarity among members within a class
   - (4) Recall/transfer requirements

b. Make plans about what to represent in statement of objectives

FORM A.5(4) or A.5(11)


INPUT
ACTION
OUTPUT
#1a.2
#3a.2
#2a.1
#1a.1
#3a.1
FORM A.5(7)
COMPETENCY ANALYSIS
LEARNING ANALYSIS
MODE ANALYSIS
#1a.4
#1a.3
#2a.2
#3a.4
#3a.3
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
CHAINS

D.1.5

STANDARDS
MATRIX

CRITERIA FOR ASSESSING ADEQUACY OF DECISION ABOUT SAMPLE OF CRITERION BEHAVIOR TO BE REPRESENTED IN A STATEMENT OF OBJECTIVES

PROPERTIES	COMPLETENESS: I	COMPLETENESS: II
CRITERIA	*Decision or plan identifies what is to be represented in a statement of objectives:* *-Number of different classes for:* *••Inputs* *••Actions* *••Outputs*	*Decision or plan identifies what is to be represented in a statement of objectives:* *-Within each class (inputs, actions, or outputs)* *••Number of members*

STEP D.1

COMPLETION CHECKLIST

	IDENTIFIED	PERFORMED	PRODUCED	FORMS COMPLETED
D.1.1	-Criterion objectives -Sub-Criterion objectives -Preparatory objectives			
D.1.2		Made final decision about: Recall/transfer requirements		
D.1.3		Made decision about: Giving students performance aids		
D.1.4		Made decision about: Direction(s) of performance		
D.1.5		Made plans about: Sample of criterion behavior to represent in statement of objectives		

STEP D.2

D.2 Prepare a statement of objectives for each lesson.

D.2.1 Develop a statement of criterion objectives to be used by you in designing instruction.

D.2.2 Develop a statement of sub-criterion and preparatory objectives to be used by you in designing instruction.

D.2.3 Develop a statement of objectives to accompany instructional materials to be given to students.

STEP D.2

OVERVIEW

INPUT	ACTION	OUTPUT
Decisions made in Step D.1 + analysis results	Prepare statements of objectives	Statements of objectives: -To be used by you in preparing instruction -To be used by students in learning

D.2.1	Plans for formulation of objectives + task description forms + task analysis forms i	Develop a statement of all criterion objectives for each lesson ii	Statement of objectives which identifies elements: -GIVEN -STUDENT WILL -RESULTING IN iii
D.2.2	A criterion objective + learning analysis results iv	Determine how many sub-objectives are needed and prepare them v	Sub-Criterion objectives + Preparatory objectives vi
D.2.3	Preparation of statement of objectives to be used by you [on FORM D.2(1)] + task analysis results vii	Prepare a statement of objectives to be given to students viii	Statement of objectives for students which identifies: -Performance requirements -Learning requirements ix

STEP D.2

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	CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
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PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*A statement of objectives for each criterion behavior.*
WHAT YOU WILL WORK FROM	(1) Plans for developing statements of objectives. (2) Task descriptions and task analysis.
WHAT YOU WILL DO	(1) Prepare a statement of objectives describing the criterion behavior to be exhibited post instruction.
FORMS YOU WILL USE	FORM D.2(1) for recording a statement of objectives describing behavior to be exhibited post-instruction.

DESCRIPTION OF Sub-STEP	D.2.1

INPUT	ACTION	OUTPUT
Plans for formulation of objectives + task description forms + task analysis forms i	→ Develop a statement of all criterion objectives for each lesson ii	→ Statement of objectives which identifies elements: -GIVEN -STUDENT WILL -RESULTING IN iii

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
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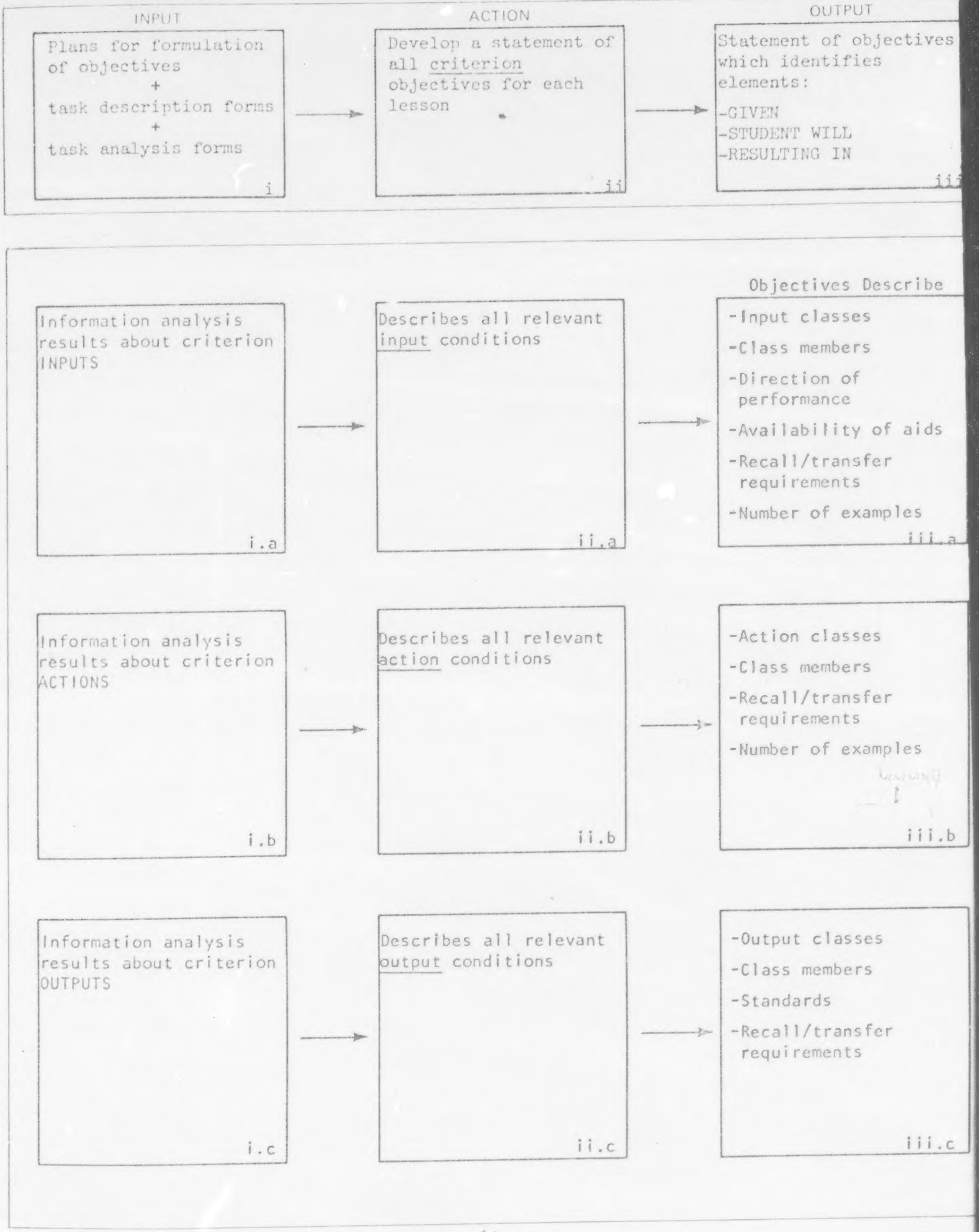
Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Plans and decisions made in	D.1	Completed Form A.5(4) or (11) carried ~~forward from~~	D.1.5	Form D.2(1)

Sub-STEP D.2.1

JOB DIAGRAM


INPUT
ACTION
OUTPUT
Plans for formulation of objectives + task description forms + task analysis forms
i
Develop a statement of all criterion objectives for each lesson
ii
Statement of objectives which identifies elements:
-GIVEN
-STUDENT WILL
-RESULTING IN
ii
Objectives Describe
Information analysis results about criterion INPUTS
i.a
Describes all relevant input conditions
ii.a
-Input classes
-Class members
-Direction of performance
-Availability of aids
-Recall/transfer requirements
-Number of examples
iii.a
Information analysis results about criterion ACTIONS
i.b
Describes all relevant action conditions
ii.b
-Action classes
-Class members
-Recall/transfer requirements
-Number of examples
iii.b
Information analysis results about criterion OUTPUTS
i.c
Describes all relevant output conditions
ii.c
-Output classes
-Class members
-Standards
-Recall/transfer requirements
iii.c

BACKGROUND INFORMATION

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Properties of statements of objectives which make them unambiguous	67

D.2.1

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING TYPES OF INFORMATION AVAILABLE FOR DESCRIBING THREE KEY ELEMENTS IN A STATEMENT OF CRITERION OBJECTIVES

ELEMENTS IN A STATEMENT OF OBJECTIVES	GIVEN: What is presented to the performer (student): ••During practice of criterion behavior ••On a criterion test	STUDENT WILL: What the performer (student) is expected to do: ••During practice of criterion behavior ••On a criterion test	RESULTING IN: What the output or outcome of what the performer (student) did: ••During practice of criterion behavior ••On a criterion test
CRITERIA FOR IDENTIFYING RELEVANT INFORMATION	*-Description of criterion INPUTS and their properties available in:* *••Task description forms* *••Task analysis forms* *-Decisions made concerning "given" portion of statement of objectives:* *••Availability of aids* *••Number of performance directions* *••Size of sample of inputs to be presented* *••New vs. old examples of input class (transfer vs. recall)*	*-Description of criterion ACTIONS and their properties available in:* *••Task description forms* *••Task analysis forms* *-Decisions made concerning "student will" portion of statement of objectives:* *••Size of sample of actions to be required* *••New vs. old examples of action class (transfer vs. recall)*	*-Description of criterion OUTPUTS and their properties available in:* *••Task description forms* *••Task analysis forms* *-Decisions made concerning "resulting in" portion of statement of objectives* *••New vs. old examples of output class (transfer vs. recall)*

D.2.1

DECISION
MATRIX

DETERMINING WHAT TO INCLUDE IN A STATEMENT OF OBJECTIVES [ON FORM D.2(1)] FOR EACH OF THREE ELEMENTS*

ELEMENTS ON FORM D.2(1)	GIVEN	STUDENT WILL	RESULTING IN
ACTION TO TAKE	*-Describe the type of INPUTS (objects, people, words, etc.)*	*-Describe the type of ACTIONS (pointing, writing, walking, etc.)*	*-Describe the type of OUTPUTS (objects, words, etc.)*
	-Describe their properties (mode, etc.)	*-Describe their properties (mode, etc.)*	*-Describe their properties (mode, standards)*
	-Identify whether aids will be available		
	-Identify whether new/old examples (transfer/recall) will be used for each class	*-Identify whether new/old examples (transfer/recall) will be used for each class*	*-Identify whether new/old examples will be required for each class*
	-Identify tentative number of examples for each class	*-Identify tentative number of examples for each class*	
	*-Identify directions of performance**		

EXAMPLES	SEE NEXT PAGE

**If performance in two directions (forward and reverse) is required, prepare two separate statements of objectives--one for each direction. All the other requirements appearing above apply to each statement of objectives which is prepared.*

Form D 2(1)

EXAMPLES*

LESSON ☐

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
	Criterion Inputs • mode: visual/verbal/etc. • number of examples from class • new and/or old examples • typical/atypical conditions • availability of performance aids	Criterion Actions • mode: recognition/editing/production • alternatives: new and/or old examples • mode: perceptual/motor/vocal/subvocal	Criterion Outputs • mode: visual/verbal/etc. • limits, standards • quantitative: amount/degree/time limits • qualitative
1.	e.g., given as a performance aid--a guide to the classification of plants which includes definitions and pictorial examples; given, either live or in pictures, any example of a plant not encountered in training (say, 10 examples) from any of the four major phyla (input classes).	Student will: correctly classify the example by endorsing from an available list all the appropriate classifications and sub-classifications; selection of correct categories is the only mode required.	Correct endorsement of each example for all categories: phylum, subphylum, class, order, family, genus, species, and variety.
2.	e.g., given any actual three-dimensional example (used in learning or not used) of a magnetized object with one pole identified as North or South, and another magnitized object with poles unidentified.	Student will bring the two objects together and then label the poles of the unlabeled object.	Correct labeling of the poles of a magnetized object as "North" or "South."
3.	e.g., given any singular personal pronouns--from each of three classes "I," "you," or "he," "she," "it," used in extemporaneous speech (RECALL) (10 examples).	Student will use the correct form of the present tense of any verb (TRANSFER).	Agreement between subject and verb--100% of the time.

*Examples below are from three different subject matters used to illustrate what to include in a statement of objectives

D.2.1

DECISION MATRIX

DETERMINING HOW TO WRITE OBJECTIVES THAT UNAMBIGUOUSLY (WITHOUT SUBJECTIVE INTERPRETATIONS) IDENTIFY THE BEHAVIOR TO BE LEARNED

ELEMENT TO BE DESCRIBED	"GIVEN"	"STUDENT WILL"	"RESULTING IN"
ACTION TO TAKE	*Describe objects, events, people's behavior, words, symbols, etc.,* *or their properties,* *in terms which are:*	*Describe behavior which is:* ••*Observable* ••*Measurable* ••*Verifiable* ••*Open to the least need for interpretation*	*Describe outputs or outcomes which are:*
EXAMPLES	-List of two digit numbers -Spanish conversation spoken by a native speaker -Displays on an instrument panel -A paragraph defining the concept "nominalism" -The man's record of fighting	-Checks -Gives an example -Defines -Lists -Adds -Points to -Etc.	-Product to two decimal places -Correctly spelled sentences -French words pronounced so that a French native cannot detect an accent -Paragraphs which build to the major conclusion appearing as the last sentence -"Completed in 15 minutes"
AVOID		Descriptions which concern the: ••Unobservable ••Unmeasurable ••Unverifiable ••Inferential ••Subjective interpretation	
EXAMPLES	-The man's hostility -A rational argument -A controversial law	-Knows -Feels -Appreciates -Senses -Enjoys -Understands	-A paragraph written with good style -Standard pronunciation of French -Completed in acceptable time

D.2.1

EXAMPLES OF DESCRIPTIONS OF "GIVEN" AND OF "RESULTING IN" DIFFERING IN DEGREE OF OBJECTIVITY, VERIFIABILITY, AND PRONENESS TO VARYING INTERPRETATIONS

EXAMPLES

	POSITIVE EXAMPLES	NEGATIVE EXAMPLES
GIVEN (INPUTS)	*INPUT to a teacher* *e.g., the student either looks out the window or doodles in his notebook all during an assigned work period* *INPUT to a technician* *e.g., group of indicators #1 indicates a malfunction; group #2 indicates an O.K. condition*	*INPUT to a teacher* *e.g., a student lacks interest in school work* *INPUT to a technician* *e.g., contradictory indications on an instrument panel*
RESULTING IN (OUTPUTS)	*e.g., corrects spelling (no errors at all) of all thirty words in the list within a fifteen minute period* *e.g., an identification of the functions served by the "checks and balances" in the American system; an identification of those functions easily and not easily fulfilled; an identification of the advantages and disadvantages of the system*	*e.g., correct spelling of all words in the time allowed* *e.g., an objective evaluation of the checks and balances in the American system*

D.2.1

EXAMPLES OF DESCRIPTIONS OF "STUDENT WILL" VARYING IN DEGREES OF OBJECTIVITY, VERIFIABILITY, AND PRONENESS TO VARYING INTERPRETATIONS

DEGREE OF ACCEPTABILITY	POOR	BETTER	BEST
SOME GENERAL EXAMPLES	••Knows ••Understands ••Appreciates ••Feels ••Enjoys	••Compares ••Differentiates ••Solves ••Recites ••Writes ••Constructs ••Predicts ••Computes ••Operates	••Gives an example ••Labels ••States a rule ••Gives a verbal definition ••Points at ••Checks off ••Groups ••Adds ••Turns switches
EXAMPLES	e.g., *knows how to determine what the amount of "current" is*	e.g., *computes the amount of "current" using formula for Ohm's Law*	e.g., *substituting values for and dividing volts by ohms, computes the amount of "current*
	e.g., *comprehends spoken Russian*	e.g., *replies to questions spoken in Russian*	e.g., *giving extemporaneous answers to questions spoken in Russian*
	e.g., *understands the meaning of "forward bias"*	e.g., *defines the term "forward bias"*	e.g., *identifies the polarity of electrical connections between terminals of diodes and of power sources involved in the term "forward bias"*

D.2.1

ILLUSTRATION SUMMARIZING PROCEDURES INVOLVED IN STATING CRITERION OBJECTIVES

FOR EACH CRITERION OBJECTIVE

#1
For: "GIVEN"

a. Review decisions made in STEP D.1 concerning:
   - Recall/transfer requirements for INPUTS
   - Performance aids
   - Direction(s) of performance
   - Sample of criterion INPUTS

b. Inspect INPUTS in task description on FORM A.5(4) or (11)

c. Inspect INPUTS task analysis results (also mode results)

d. Formulate "GIVEN" on FORM D.2(1)

#2
For: "STUDENT WILL"

a. Review decisions made in STEP D.1 concerning:
   - Recall/transfer requirements for ACTIONS
   - Sample of criterion ACTIONS

b. Inspect ACTIONS in task description on FORM A.5(4) or (11)

c. Inspect ACTIONS task analysis results (also mode results)

d. Formulate "STUDENT WILL" on FORM D.2(1)

#3
For: "RESULTING IN"

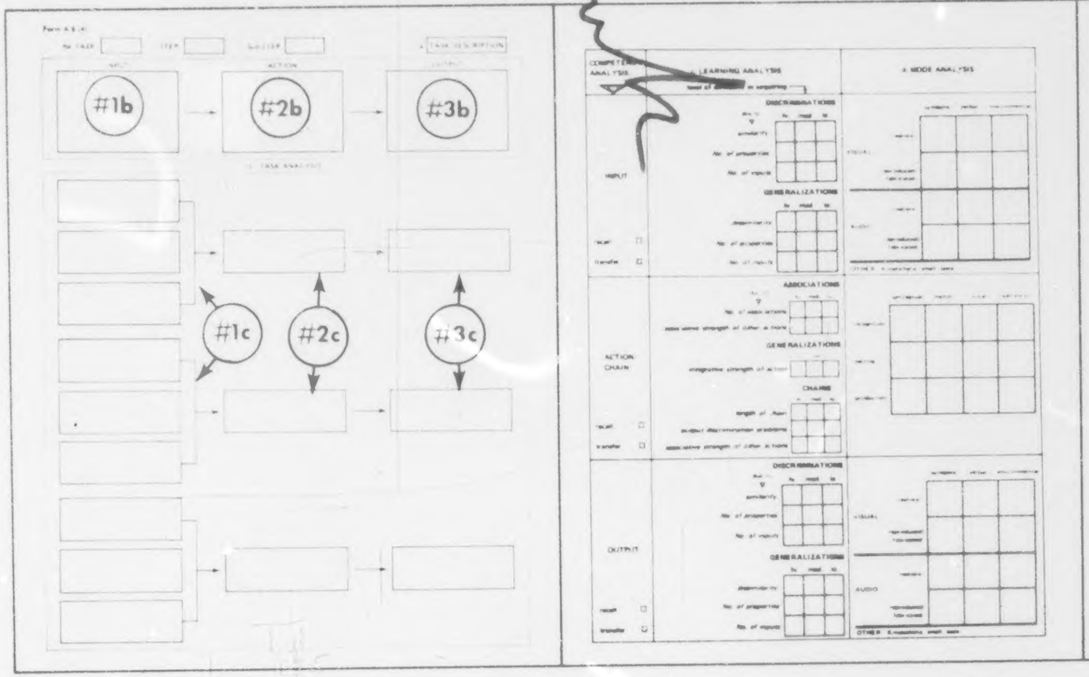
a. Review decisions made in STEP D.1 concerning:
   - Recall/transfer requirements for OUTPUTS
   - Sample of criterion OUTPUTS

b. Inspect OUTPUTS in task description on FORM A.5(4) or (11)

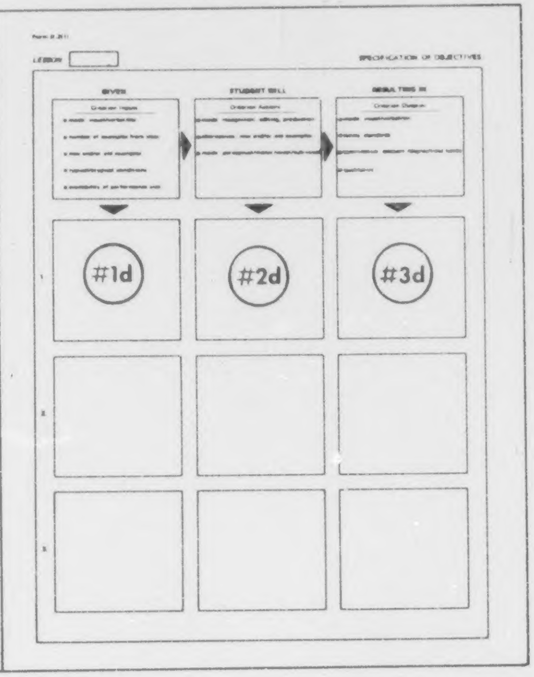
c. Inspect OUTPUTS task analysis results (also mode results)

d. Formulate "RESULTING IN" on FORM D.2(1)

FORM A.5(4)


#1b
#2b
#3b
#1c
#2c
#3c
INPUT
ACTION CHAIN
OUTPUT
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
CHAINS

FORM D.2(1)


SPECIFICATION OF OBJECTIVES
GIVEN
STUDENT WILL
RESULTING IN
#1d
#2d
#3d

JOB PROCEDURES

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D.2.1

ILLUSTRATION SUMMARIZING PROCEDURES INVOLVED IN STATING CRITERION OBJECTIVES

FOR EACH CRITERION OBJECTIVE

#1
For: "GIVEN"

a. Review decisions made in STEP D.1 concerning:
   - -Recall/transfer requirements for INPUTS
   - -Performance aids
   - -Direction(s) of performance
   - -Sample of criterion INPUTS
b. Inspect INPUTS in task description on FORM A.5(4) or (11)
c. Inspect INPUTS task analysis results (also mode results)
d. Formulate "GIVEN" on FORM D.2(1)

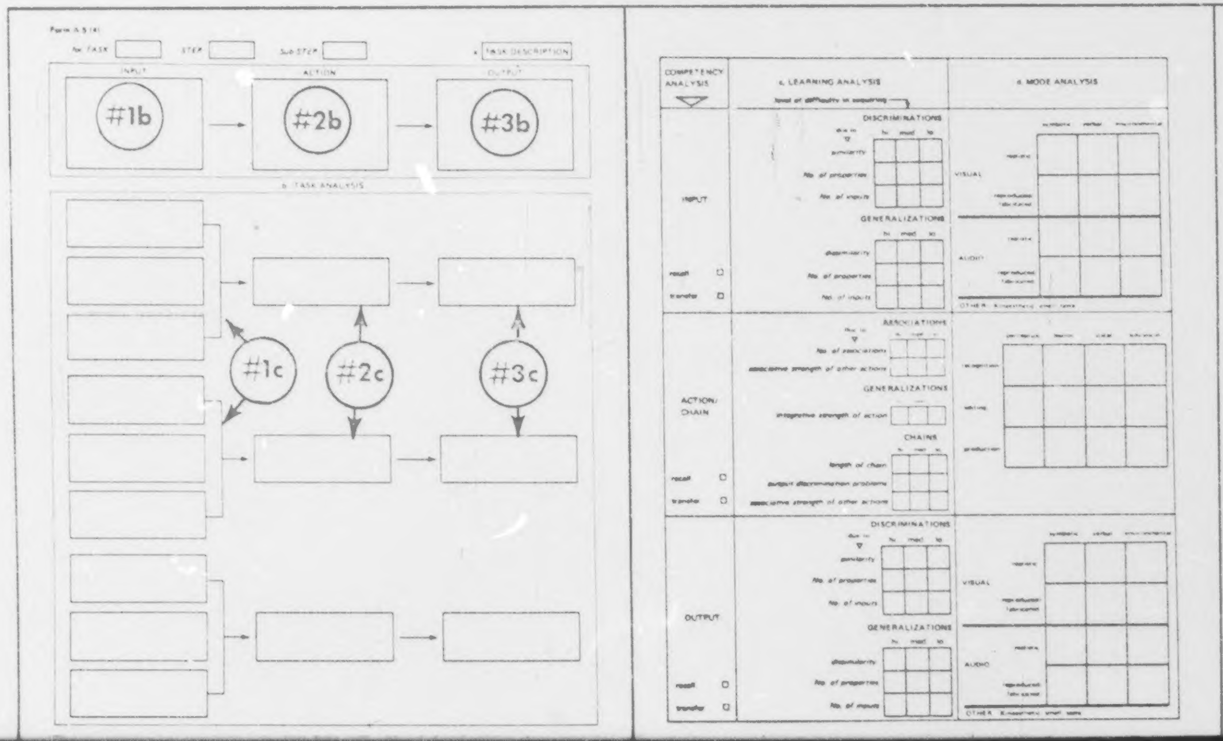
#2
For: "STUDENT WILL"

a. Review decisions made in STEP D.1 concerning:
   - -Recall/transfer requirements for ACTIONS
   - -Sample of criterion ACTIONS
b. Inspect ACTIONS in task description on FORM A.5(4) or (11)
c. Inspect ACTIONS task analysis results (also mode results)
d. Formulate "STUDENT WILL" on FORM d.2(1)

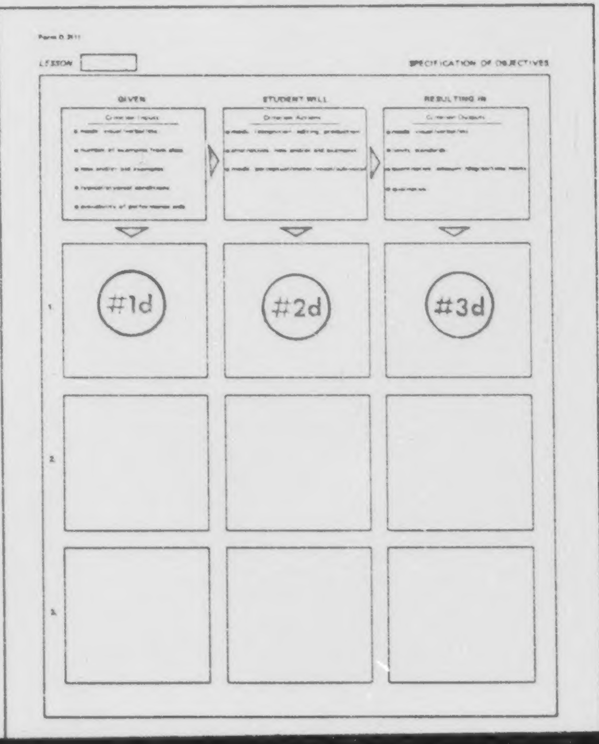
#3
For: "RESULTING IN"

a. Review decisions made in STEP D.1 concerning:
   - -Recall/transfer requirements for OUTPUTS
   - -Sample of criterion OUTPUTS
b. Inspect OUTPUTS in task description on FORM A.5(4) r (11)
c. Inspect OUTPUTS task analysis (also mode results)
d. Formulate "RESULTING IN" on FORM D.2(1)

FORM A.5(4)


Form A.5(4)
for TASK
STEP
Sub-STEP
TASK DESCRIPTION
INPUT
ACTION
OUTPUT
#1b
#2b
#3b
TASK ANALYSIS
#1c
#2c
#3c
COMPETENCY ANALYSIS
LEARNING ANALYSIS
MODE ANALYSIS
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
CHAINS
INPUT
ACTION/CHAIN
OUTPUT
VISUAL
AUDIO
recall
transfer

FORM D.2(1)


Form D.2(1)
LESSON
SPECIFICATION OF OBJECTIVES
GIVEN
STUDENT WILL
RESULTING IN
1.
2.
3.
#1d
#2d
#3d

D.2.1

STANDARDS
MATRIX

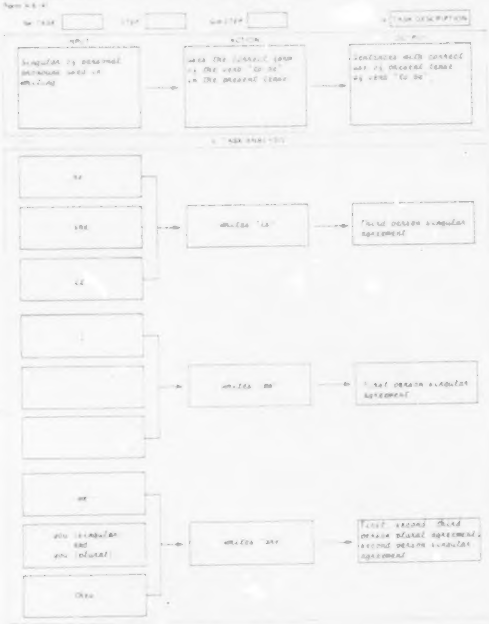
CRITERIA FOR ASSESSING THE ADEQUACY OF A STATEMENT OF OBJECTIVES

PROPERTIES	COMPLETENESS	OBJECTIVITY	CONTAINS TRAINING AND TESTING IMPLICATIONS
CRITERIA	*-Covers three elements* *••Given (the input to the student)* *••Student will (the action the student takes)* *••Resulting in (the student's output)* *-Identifies earlier planning decisions* *••Direction of performance* *••Availability of aids* *••Recall/transfer requirements* *••Sample of criterion behavior*	*Description of "given," "student will," and "resulting in" is in terms which are:* *-Observable* *-Measurable* *-Verifiable* *-Subject to the least amount of interpretation (is objective rather than subjective)*	*-Identifies mode or format of problem* *••Multiple choice vs. production* *••Visual/verbal examples* *-Identifies standards* *••Quantity* *••Quality* *••Time requirements*

D.2.1

EXAMPLE ILLUSTRATING "A STATEMENT OF CRITERION OBJECTIVES"

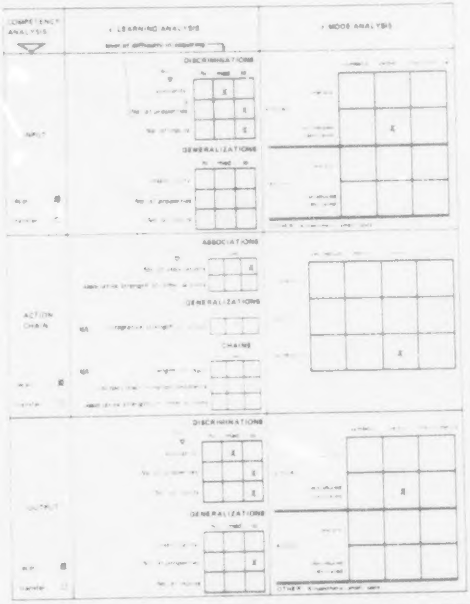
EXAMPLES

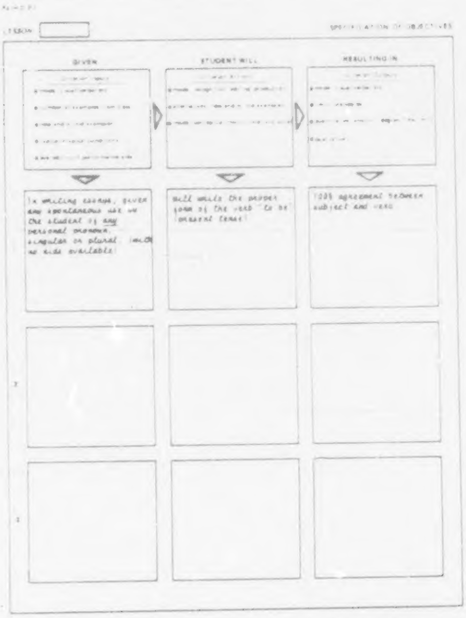

TASK DESCRIPTION

INPUT	ACTION	OUTPUT
Singular or personal pronouns used in writing	uses the correct form of the verb "to be" in the present tense	Sentences with correct use of present tense of verb "to be".

TASK ANALYSIS

he she it	writes "is"	Third person singular agreement
I	writes "am"	First person singular agreement
we you (singular) and you (plural) they	writes "are"	First, second, third person plural agreement, second person singular agreement


COMPETENCY ANALYSIS
LEARNING ANALYSIS
MODE ANALYSIS
INPUT
DISCRIMINATIONS
GENERALIZATIONS
ASSOCIATIONS
ACTION CHAIN
GENERALIZATIONS
CHAINS
OUTPUT
DISCRIMINATIONS
GENERALIZATIONS
X
X
X
X
X
X
X
X


LESSON

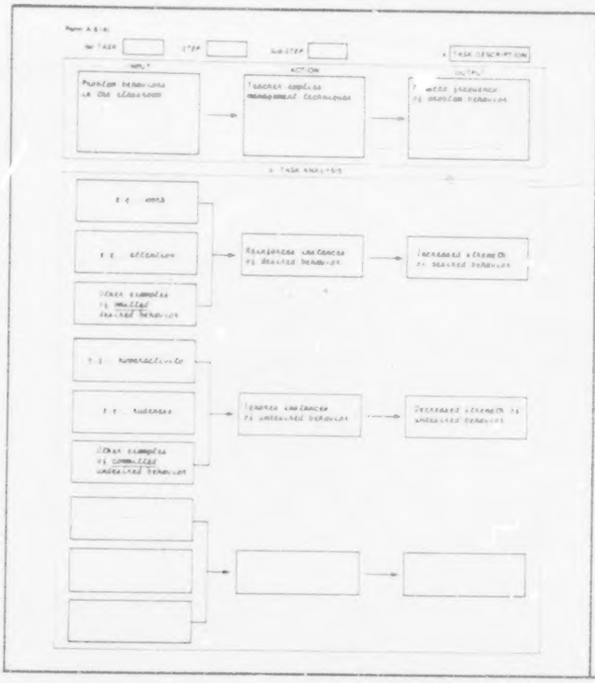
SPECIFICATION OF OBJECTIVES

GIVEN	STUDENT WILL	RESULTING IN
In writing essays, given any spontaneous use by the student of any personal pronoun, singular or plural. (with no aids available)	will write the proper form of the verb "to be" (present tense)	100% agreement between subject and verb

D.2.1

EXAMPLE ILLUSTRATING THE PREPARATION OF A "STATEMENT OF OBJECTIVES"

EXAMPLES



TASK DESCRIPTION

INPUT: Problem behaviors in the classroom

ACTION: Teacher applies management techniques

OUTPUT: Reduces frequency of problem behavior

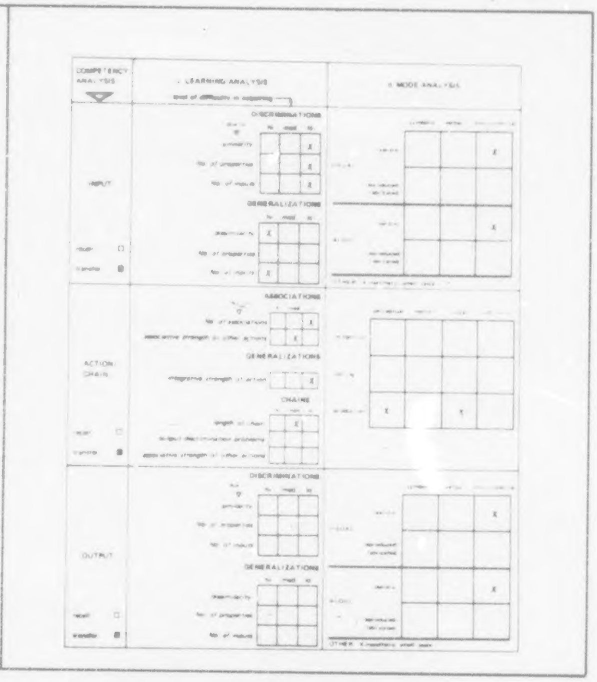
TASK ANALYSIS

e.g. work
e.g. attention
Other examples of omitted desired behavior

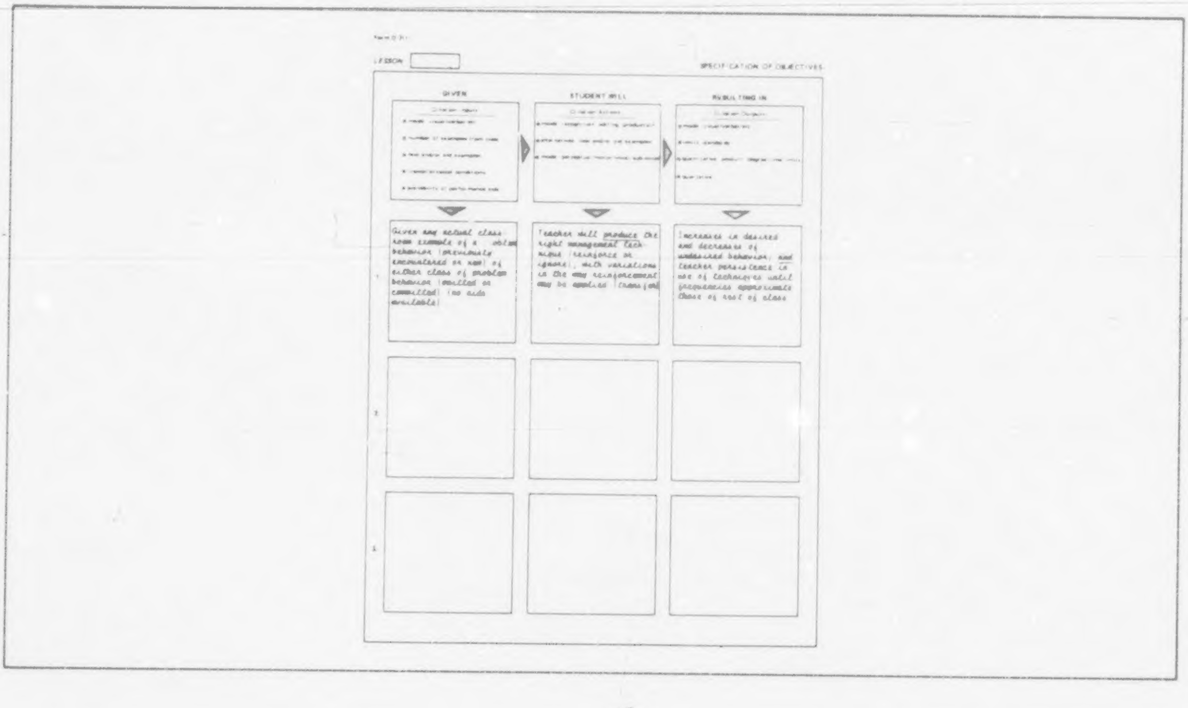
Reinforces instances of desired behavior → Increases strength of desired behavior

e.g. hyperactivity
e.g. rudeness
Other examples of committed undesired behavior

Ignores instances of undesired behavior → Decreased strength of undesired behavior



COMPETENCY ANALYSIS
LEARNING ANALYSIS
MODE ANALYSIS
INPUT
DISCRIMINATIONS
GENERALIZATIONS
ACTION/CHAIN
ASSOCIATIONS
GENERALIZATIONS
CHAINS
OUTPUT
DISCRIMINATIONS
GENERALIZATIONS
recall ☐
transfer ■



LESSON

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
1	Given any actual classroom example of a problem behavior (previously encountered or new) of either class of problem behavior (omitted or committed) (no aids available)	Teacher will produce the right management technique (reinforce or ignore), with variations in the way reinforcement may be applied (transfer)	Increases in desired and decreases of undesired behavior, and teacher persistence in use of techniques until frequencies approximate those of rest of class
2			
3			

LESSON ☐

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
	Criterion Inputs ● mode: visual/verbal/etc. ● number of examples from class ● new and/or old examples ● typical/atypical conditions ● availability of performance aids	Criterion Actions ● mode: recognition, editing, production ● alternatives: new and/or old examples ● mode: perceptual/motor/vocal/sub-vocal	Criterion Outputs ● mode: visual/verbal/etc. ● limits, standards ● quantitative: amount /degree/time limits ● qualitative
1.			
2.			
3.			

LESSON ☐

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
	Criterion Inputs ● mode: visual/verbal/etc. ● number of examples from class ● new and/or old examples ● typical/atypical conditions ● availability of performance aids	Criterion Actions ● mode: recognition, editing, production ● alternatives: new and/or old examples ● mode: perceptual/motor/vocal/sub-vocal	Criterion Outputs ● mode: visual/verbal/etc. ● limits, standards ● quantitative: amount /degree/time limits ● qualitative
1.			
2.			
3.			

PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*A statement for each sub-objective.*
WHAT YOU WILL WORK FROM	(1) Statement of a criterion objective. (2) Learning analysis results.
WHAT YOU WILL DO	(1) Determine how many sub-objectives are needed. (2) Prepare a statement for each sub-objective.
FORMS YOU WILL USE	FORM D.2(1) for recording preparatory objectives.

DESCRIPTION OF Sub-STEP	D.2.2

INPUT	ACTION	OUTPUT
A criterion objective + learning analysis results iv	Determine how many sub-objectives are needed and prepare them v	Sub-criterion objectives + Preparatory objectives vi

Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: Types of preparatory objectives . . 82, 83 -MATRIX: How criterion behavior can be modified. . 85 -MATRIX: How many preparatory objectives are there likely to be 91	-MATRIX: When to prepare different types of objectives . 88, 89 -MATRIX: What to include in statement of objectives . . . 95 -MATRIX: Where to get information . . . 94	-MATRIX: Adequacy of description of preparatory objectives 103	FORM D.2(1) SUMMARY OF PROCEDURES . . .100, 101

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
Planning decisions regarding objectives	D.1	Completed FORM A.5(4) or (11) and FORM D.2(1) carried forward from	D.2.1	Portion of FORM D.2(1)

Sub-STEP D.2.2

JOB DIAGRAM

INPUT	ACTION	OUTPUT
A criterion objective + learning analysis results iv	Determine how many sub-objectives are needed and prepare them v	Sub-criterion objectives + Preparatory objectives vi

Criterion behavior described in criterion objective can be practiced intact--at the start of instruction iv.a	Do NOT develop a sub-criterion or a preparatory objective v.a	A criterion objective only vi.a
-iv.a (above) does NOT pertain -Part of criterion behavior can be practiced intact--at the start of instruction iv.b	Develop a sub-criterion objective v.b	A sub-criterion objective calling for practice of: -A self-contained, intact terminal behavior or sub-step -Self-contained, intact sub-step(s) vi.b
-iv.b (above) does NOT pertain iv.c	Develop a preparatory objective v.c	A preparatory objective calling for practice of: -Non-intact Sub-STEPS -A component skill ••Discriminations ••Generalizations ••Associations ••Series of associations vi.c

BACKGROUND INFORMATION

	page
How sub-criterion or preparatory objectives might differ from a "parent" criterion objective	82
Two types of sub-criterion objectives	83-84
Three types of preparatory objectives	85
Differences between criterion, sub-criterion, and preparatory objectives	86

D.2.2

CRITERIA FOR IDENTIFYING WAYS IN WHICH A STATEMENT OF OBJECTIVES MIGHT CALL FOR DEVIATIONS FROM CRITERION BEHAVIOR

IDENTIFICATION MATRIX

CHANGES IN ELEMENTS OF AN OBJECTIVE	Differences from ••The criterion "GIVEN" portion of an objective	Differences from ••The criterion "STUDENT WILL" portion of an objective	Differences from ••The criterion "RESULTING IN" portion of an objective
CRITERIA	*-The number of INPUTS presented* *-Their properties (mode, problem format)* *-Recall/transfer requirements* *-Availability of aids* *-Direction of performance*	*-Size or scope of ACTION required* *-Its mode requirements: recognize, edit, or produce* *-Recall/transfer requirements*	*-Number of OUTPUTS required* *-Standards* *·Size or scope* *·Quality*

EXAMPLES	-Availability of aids e.g., *a French dictionary may be made available while student is learning to associate English meanings of particular words; criterion behavior (objectives) calls for no dictionary available*	-Mode of action e.g., *the student of French is supposed to be able to produce the English equivalent of a French word (in the criterion behavior); a modification might require him merely to select one of four options (i.e., multiple choice)*	-Standards e.g., *a correct square root to five decimals is the criterion standard; the modification might require only two places*
	-Number of INPUTS available (which affects problem format) e.g., *a "cumulus" and a "nimbus" cloud are presented simultaneously (in photographs)* (to determine if the student can differentiate between them) *In the criterion behavior only one cloud type would be presented which the student would have to be able to identify*	-Recall/transfer requirements e.g., *the statistics student is supposed to be able (in criterion behavior) to compute a mean using either the grouped or ungrouped method; a modification might require (for a given problem) only the ungrouped method*	-Number of OUTPUTS e.g., *instead of a single output as in the criterion situation, the student might be given two or three examples of punctuated sentences* (to select the correct one)

D.2.2

CRITERIA FOR IDENTIFYING TWO TYPES OF Sub-CRITERION OBJECTIVES

IDENTIFICATION MATRIX

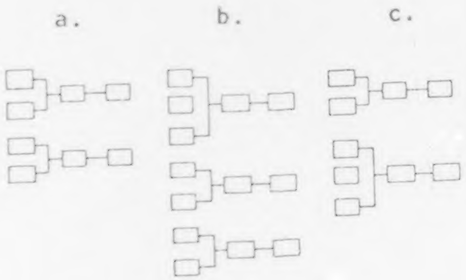
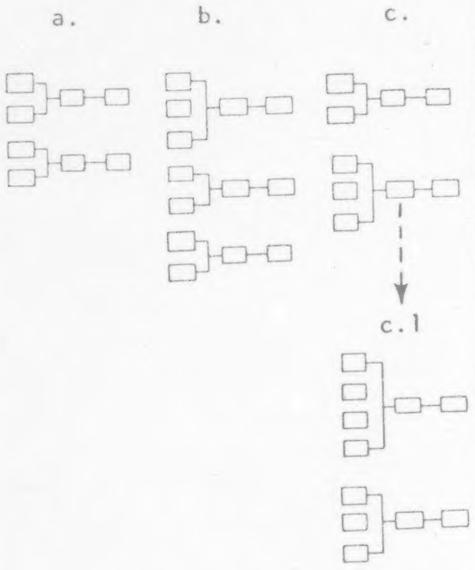
	I.	II.
TYPES	Sub-CRITERION Objective: A component of the criterion behavior	Sub-CRITERION Objective: A prerequisite for the criterion behavior
CRITERIA	*-Student must exhibit behavior which is all of the following:* *••An intact part of the criterion behavior described in a statement of criterion objectives* *••Self-contained, having a natural or logical end point or output; AND* *••NOT different from the criterion behavior, except in scope (e.g., the number of Sub-STEPS involved)*	*-Behavior which is all of the following:* *••NOT an intact part of the criterion behavior described in a statement of criterion objectives;* *••Self-contained, having a natural or logical end point or output; OR* *••Differs from the criterion behavior:* */Is a prerequisite behavior identified in more detailed lower level task analyses*

EXAMPLES	CRITERION BEHAVIOR: All the steps in testing for the significance of the difference between means of two distributions of scores	
	e.g., *computing the mean for each of the two distributions*	e.g., *selecting an appropriate formula for matched and unmatched groups*
	e.g., *computing the standard deviation for each of the two distributions*	e.g., *using a t table to find statistical significance of an observed difference*
	e.g., *computing the standard error of the difference between means*	e.g., *identifying the formula for a standard error which is appropriate to the size of the groups being compared*

D.2.2

EXAMPLES OF THE TWO TYPES OF Sub-CRITERION OBJECTIVES

EXAMPLES

TYPES	Sub-CRITERION Objective: I Different from the criterion behavior in scope only	Sub-CRITERION Objective: II A prerequisite for the criterion behavior
#1	The total chain of a, b, and c is the criterion behavior  The sub-criterion behavior might consist of sub-steps a, b, or c alone or pairs of sub-steps from among a, b, and c	 The sub-criterion behavior might consist of more detailed, lower level sub-sub-step(s) for one or more of the sub-steps (e.g., C-1)
#2 CRITERION Behavior: Selecting and using an appropriate formula to solve a problem (e.g., Ohm's Law)	e.g., *given a problem and a formula, substituting values and solving the problem*	e.g., *doing a problem in multiplication or division*
#3 CRITERION: Threading a film projector	e.g., *checking whether film in an already threaded projector has been correctly threaded*	e.g., *determining the adequacy of a properly projected visual image*

D.2.2

IDENTIFICATION
MATRIX

CRITERIA FOR IDENTIFYING THREE TYPES OF PREPARATORY OBJECTIVES

	I. PREPARATORY Objective: A component of the criterion behavior	II. PREPARATORY Objective: Skills within a component of the criterion behavior	III. PREPARATORY Objective: NON-criterion behavior
TYPES			
CRITERIA	-Student must exhibit behavior which is: ••An intact part of the criterion behavior described in a statement of criterion objectives ••NOT self-contained, not having a natural or logical endpoint or output ••NOT different from the criterion behavior except in scope	-Student must exhibit behavior which is: ••An intact part of the criterion behavior described in a statement of criterion objectives ••NOT self-contained ••Differs from the criterion behavior: /Involves practice of component skills (discriminations, generalizations, or associations), i.e., lower level skills	-Student must exhibit behavior which is: ••NOT a part of the criterion behavior described in a statement of criterion objectives ••Self-contained ••Differs from the criterion behavior: /May involve the deviations from criterion behavior described on page 82 /May involve behavior totally different from the criterion behavior
	CRITERION BEHAVIOR: All the steps in testing for the significance of the difference between means of two distributions of scores		
EXAMPLES	e.g., entering the right column and right row of a table of "t"	e.g., discriminating between the meaning of symbols: ΣX^2 and $(\Sigma X)^2$	e.g., identifying what the formula is for the standard error of the difference both for matched and unmatched groups e.g., stating when you would use a one-tailed or two-tailed t-test

D.2.2

IDENTIFICATION MATRIX

CRITERIA FOR DISTINGUISHING BETWEEN: CRITERION, SUB-CRITERION, AND PREPARATORY OBJECTIVES

TYPES	CRITERION Objectives	SUB-CRITERION Objectives	PREPARATORY Objectives
CRITERIA	-The total behavior is (total series of sub-steps) expected of the learner	-Only a portion of the total behavior is expected of the learner ••May be a portion from the horizontal series of Sub-STEPS which make up the criterion behavior ••May be a portion from the vertical analysis of prerequisite behaviors -The portion may be: ••An intact part of the criterion behavior (horizontal portion), or ••A non-intact part of the criterion behavior (i.e., a vertical portion) -The portion must be: ••Self-contained, having a natural or logical endpoint	-May be either a horizontal or vertical portion of the criterion behavior ••This portion is, however, not self-contained ••May or may not differ from the criterion or sub-criterion behavior -May consist of deviations from criterion behavior -May be totally different from criterion behavior

DETERMINING WHICH TYPE AND HOW MANY TYPES OF OBJECTIVES TO DEVELOP

ISSUES	See page
Conditions requiring the development of criterion and preparatory objectives	88
Priorities in developing different types of preparatory objectives	89
Conditions requiring differing numbers of preparatory objectives	90

D.2.2
IDENTIFICATION
MATRIX

CRITERIA FOR IDENTIFYING CONDITIONS WHEN IT WILL BE NECESSARY TO STATE: CRITERION, Sub-CRITERION, AND PREPARATORY OBJECTIVES

CONDITIONS	Need to develop CRITERION OBJECTIVES	Need to develop Sub-CRITERION OBJECTIVES which make no changes in CRITERION BEHAVIOR	Need to develop PREPARATORY OBJECTIVES which make changes in CRITERION BEHAVIOR
CRITERIA	*-Always*	*-When the student does not know how to perform the part or parts of the criterion behavior* *AND* *-It is too difficult for him to engage in practice of the whole criterion behavior directly*	*-When the student has not learned a component skill which is part of a sub-criterion or criterion behavior* *AND* *-It is too difficult for him to engage in practice of the whole sub-criterion or criterion behavior*
FUNCTION	Creates specifications for practice of CRITERION BEHAVIOR	Creates specifications for practice of INTACT PART OF CRITERION BEHAVIOR which facilitates later practice of criterion behavior	Creates specifications for practice of COMPONENT SKILLS which facilitates later practice of Sub-CRITERION or CRITERION behaviors

D.2.2

DETERMINING ORDER OF PRIORITIES IN DEVELOPING STATEMENT OF OBJECTIVES

DECISION MATRIX

	FIRST PRIORITY	SECOND PRIORITY	THIRD PRIORITY
CONDITIONS	Judgment is made that: (a) Students WILL BE able to engage in practice of criterion behavior- at the start (assistance may be provided)	Judgment is made that: (a) Students will NOT be able to engage in practice of criterion behavior- at the start, even with assistance provided (b) Students WILL BE able to engage in practice of part of criterion behavior- at the start (assistance may be provided)	Judgment is made that: (a) Students will NOT be able to engage in practice of criterion behavior- at the start (b) Students will NOT be able to engage in practice of part of criterion behavior- at the start, even with assistance provided
ACTION TO TAKE	*Prepare an objective for the criterion behavior, the largest unit of behavior the student is capable of starting with.*	*Prepare a sub-criterion objective for part of the criterion behavior, the largest unit of behavior the student is capable of starting with.* *	*Prepar a preparatory objective for the largest unit of the criterion behavior the student is capable of starting with.* **

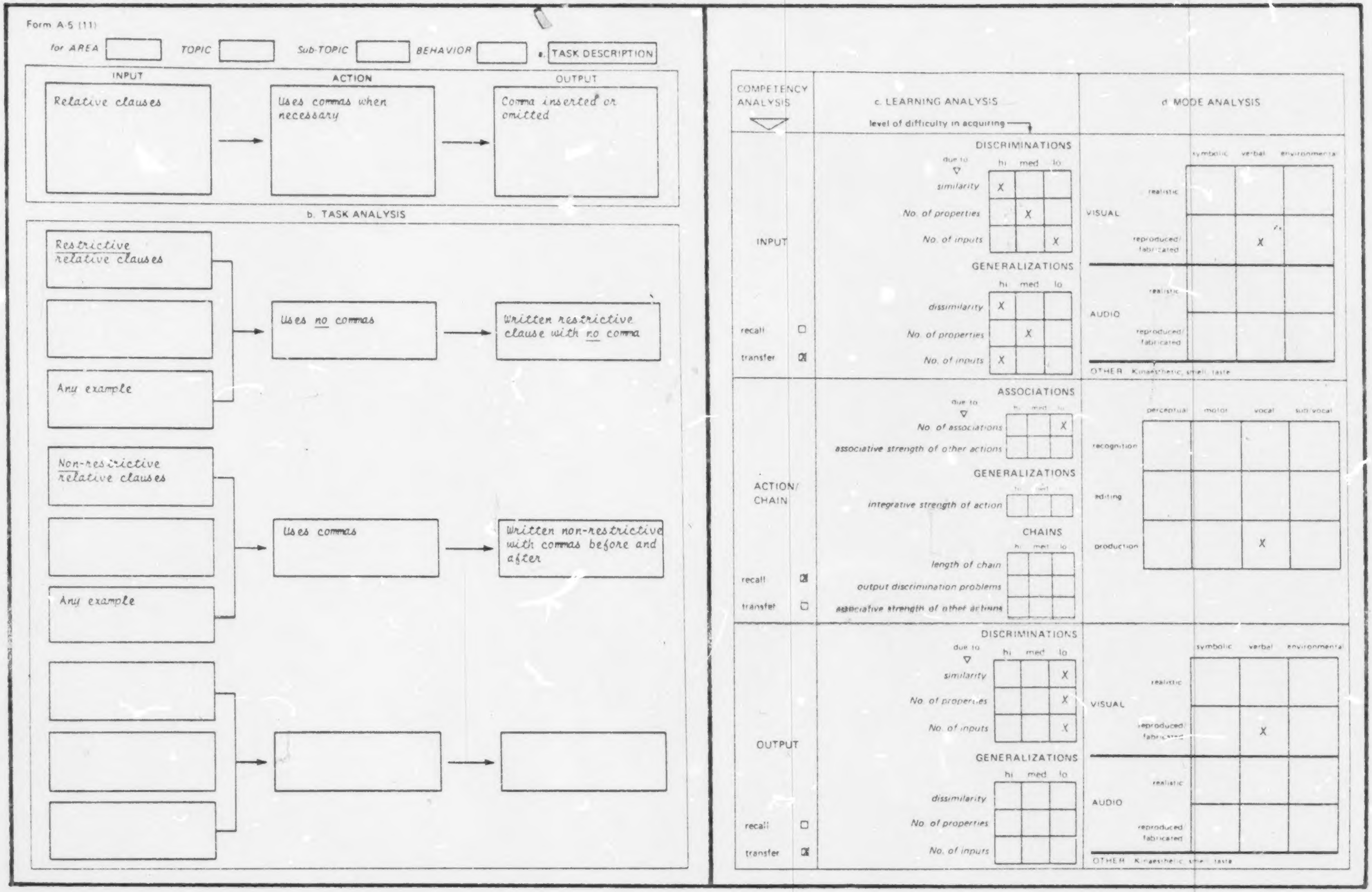
*A criterion objective should also be specified; because eventually the learner will be expected to exhibit the behavior required by it.

**A criterion objective should and/or a sub-criterion objective should also be specified.

D.2.2

EXAMPLE ILLUSTRATING THE DECISION PRIORITIES IN DETERMINING WHAT WILL BE AN OBJECTIVE (ON THIS PAGE AND ON OPPOSITE PAGE)

FORM A.5(4) or A.5(11)



Form A.5 (11)

for AREA ☐ TOPIC ☐ Sub-TOPIC ☐ BEHAVIOR ☐ a. TASK DESCRIPTION

INPUT	ACTION	OUTPUT
Relative clauses	Uses commas when necessary	Comma inserted or omitted

b. TASK ANALYSIS

Restrictive relative clauses Any example	Uses no commas	Written restrictive clause with no comma
Non-restrictive relative clauses Any example	Uses commas	Written non-restrictive with commas before and after

COMPETENCY ANALYSIS	c. LEARNING ANALYSIS (level of difficulty in acquiring)	d. MODE ANALYSIS

INPUT — recall ☐ transfer ☒

DISCRIMINATIONS

due to	hi	med	lo
similarity	X		
No. of properties		X	
No. of inputs			X

GENERALIZATIONS

	hi	med	lo
dissimilarity	X		
No. of properties		X	
No. of inputs	X		

		symbolic	verbal	environmental
VISUAL	realistic			
	reproduced/ fabricated		X	
AUDIO	realistic			
	reproduced/ fabricated			

OTHER Kinaesthetic, smell, taste

ACTION/ CHAIN — recall ☒ transfer ☐

ASSOCIATIONS

due to	hi	med	lo
No. of associations			X
associative strength of other actions			

GENERALIZATIONS

	hi	med	lo
integrative strength of action			

CHAINS

	hi	med	lo
length of chain			
output discrimination problems			
associative strength of other actions			

	perceptual	motor	vocal	sub-vocal
recognition				
editing				
production			X	

OUTPUT — recall ☐ transfer ☒

DISCRIMINATIONS

due to	hi	med	lo
similarity			X
No. of properties			X
No. of inputs			X

GENERALIZATIONS

	hi	med	lo
dissimilarity			
No. of properties			
No. of inputs			

		symbolic	verbal	environmental
VISUAL	realistic			
	reproduced/ fabricated		X	
AUDIO	realistic			
	reproduced/ fabricated			

OTHER Kinaesthetic, smell, taste

First Priority	Second Priority	Third Priority
(a) If judgment is made that the student can *e.g., with aid of a rule and examples provided, write any sentence with a relative clause and use commas correctly,* develop only a criterion objective	(a) If judgment is made that the student can *e.g., when told a sentence is restrictive or non-restrictive, correctly insert or omit a comma,* develop a sub-criterion objective	(a) Create preparatory objectives: *e.g., objectives calling for making discriminations between restrictive and non-restrictive clauses--say, choosing among options; also, objectives calling for generalization to any example of restrictive or non-restrictive clauses;* there is not likely to be a preparatory objective for the "association"--since it is relatively easy to learn
(b) If judgment is made that the student cannot do this, develop a criterion objective PLUS proceed to "second" priority	(b) If judgment is made that the student cannot do this, proceed to "third" priority	

D 2.2

IDENTIFICATION MATRIX

CRITERIA FOR IDENTIFYING HOW MANY OBJECTIVES THERE MAY BE FOR EACH CRITERION OBJECTIVE

TYPES OF PREPARATORY OBJECTIVES	Sub-Criterion Objectives		Preparatory Objectives
	Knowledge domain	Performance	
CRITERIA	*-Terminal behavior not already in learner's repertoire* *-Number of them can range from 0 → n, depending on:* *••Size of the criterion behavior involved in the criterion objective* *••Which terminal behaviors the learner already knows and doesn't know*	*-Sub-steps not already in learner's repertoire* *-Number of them can range from 0 → n, depending on:* *••Size of the criterion behavior involved in the criterion objective* *••Which sub-steps the learner already knows and doesn't know*	*-Component skills not already in learner's repertoire* *-Only those component skills likely to be difficult to learn or known to be error-prone* *-Number of them can range from 0 → n, depending on:* *••Size of the criterion behavior involved in the criterion objective* *••Which component skills the learner already knows and doesn't know*
CONTRASTING EXAMPLES (within a column)	e.g., *Ohm's Law only involves three concepts [which might provide r for three y sub-criterion objectives (i.e., "current," "voltage," and "resistance"* *VS.* e.g., *Bernoull's principle which involves four constituent concepts, i.e., "displacement of fluid"; "weight of displaced fluid," "magnitude of the buoyant force," and "size of apparent loss of weight"*	e.g., *a complex performance, like developing instructional materials, would have more sub-steps and hence more sub-criterion objectives* *VS.* e.g., *computing an arithmetical mean which has fewer sub-steps*	e.g., *the student has to learn to associate singular personal pronouns with the appropriate form of verbs* This need to learn to associate would be a preparatory objective *VS.* e.g., *the student does not have to learn to discriminate among 1st, 2nd, and 3rd person pronouns; he already can* Learning to discriminate would not be a preparatory objective

JOB PROCEDURES

	page
Information sources to review	96
What to include in a statement of preparatory objectives	97
SUMMARY OF PROCEDURES	100, 101
Adequacy of the statement of preparatory objectives	103

D.2.2

DECISION
MATRIX

DETERMINING WHICH TYPES (SOURCES) OF INFORMATION TO USE IN DEVELOPING A STATEMENT OF Sub-CRITERION OR PREPARATORY OBJECTIVES

TYPES OF OBJECTIVES	For Sub-Criterion Objectives	For Preparatory Objectives
ACTION TO TAKE	*-Use decisions made in D.1*	*-Use decisions made in D.1*
	-Use task description and task analysis information available on FORM A.5(11) (for knowledge domain terminal behavior) or on FORM A.5(4) (for performance sub-STEP	*-Use task analysis information available on FORM A.5(4) or (11)*
	-For each element of an objective:	*-For each element of an objective:*
	••Use information in INPUT section to describe "GIVEN"	*••Use information in INPUT section to describe "GIVEN"*
	••Use information in ACTION section to describe "STUDENT WILL"	*••Use information in ACTION section to describe "STUDENT WILL"*
	••Use information in OUTPUT section to describe "RESULTING IN"	*••Use information in OUTPUT section to describe "RESULTING IN"*
	-Use associated learning analysis results to determine if students already have learned the:	*-Use associated learning analysis results to determine if students already have learned the component:*
	••Self-contained terminal behavior *••Self-contained sub-step* *••Non-self-contained sub-step*	*••Discriminations* *••Generalizations* *••Associations (or series of associations*
	-If they haven't already learned them, use the learning analysis results to determine if it will be difficult to learn them	*-If they haven't already learned them, use the learning analysis results to determine if it will be difficult to learn them*

D.2.2

DETERMINING WHAT TO INCLUDE IN A STATEMENT OF OBJECTIVES: FOR EACH OF TWO TYPES

DECISION MATRIX

TYPES OF OBJECTIVES	Sub-Criterion Objectives	Preparatory Objectives
ACTION TO TAKE	*In describing "GIVEN" identify:* *-The type of criterion INPUTS* *-Their properties* *-Number of classes of criterion INPUTS* *-Whether aids will be available* *-Direction of performance* *-Whether new/old examples will be used* *-Tentative number of examples for each class* *In describing "STUDENT WILL" identify:* *-Type of criterion ACTION* *-Properties of action* *-Number of classes of actions* *-Whether new/old examples will be used* *-Tentative number of examples* *In describing "RESULTING IN" identify:* *-Type of criterion OUTPUT* *-Properties of output (standards)* *-Number of classes* *-Whether new/old examples will be required*	*In describing "GIVEN" identify:* *-The type of preparatory INPUTS* *-Their properties* *-Their number* *-Whether new/old examples will be used* *-Direction of performance* *-Whether aids will be available* *-Tentative number of examples* *In describing "STUDENT WILL" identify:* *-Type of preparatory ACTION* *-Properties (mode; e.g., multiple choice)* *-Whether new/old examples will be used* *-Tentative number of examples* *In describing "RESULTING IN" identify:* *-Type of preparatory OUTPUT* *-Properties of output (standards)* *-Number of classes* *-Whether new/old examples will be required*
	FORM D.2(1) Same as for criterion objectives; label sub-criterion or preparatory objectives as such	
EXAMPLES	See page 98	See page 99

Form D.2(1)

LESSON ☐ EXAMPLE

INTACT Preparatory Objectives

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
	Criterion Inputs ● mode: visual/verbal/etc. ● number of examples from class ● new and/or old examples ● typical/atypical conditions ● availability of performance aids	Criterion Actions ● mode: recognition, editing, production ● alternatives: new and/or old examples ● mode: perceptual/motor/vocal/sub-vocal	Criterion Outputs ● mode: visual/verbal/etc. ● limits, standards ● quantitative: amount /degree/time limits ● qualitative
CRITERION 1.	e.g., GIVEN -A series of classroom instances of improvements or non-improvements in child behavior (some used in training, others not) -No aids present -Five separate children	e.g., THE STUDENT WILL -The teacher trainee will deliver or not deliver reinforcement -Reinforcement being delivered in varied ways, some new, some old	e.g., RESULTING IN -Correct shaping of gradual approximations (improvements in quantity or quality of child behavior)
Sub-CRITERION 2.	e.g., GIVEN Given a single classroom instance of a child's behavior (representing an improvement or non-improvement over the last instance) -In non-encountered behavior area -One child -No aids	e.g., THE STUDENT WILL -The teacher trainee will either deliver or not deliver reinforcement -In any way (new/old)	e.g., RESULTING IN -Delivery of reinforcement only for an improvement over the last reinforced episode
3.			

Form D.2(1)

LESSON ☐ EXAMPLE

MODIFIED Preparatory Objectives

SPECIFICATION OF OBJECTIVES

	GIVEN	STUDENT WILL	RESULTING IN
	Criterion Inputs • mode: visual/verbal/etc. • ~~number of examples from class~~ • new and/or old examples • typical/atypical conditions • availability of performance aids	Criterion Actions • mode: recognition, editing, production • ~~alternatives: new and/or old examples~~ • mode: perceptual/motor/vocal/sub-vocal	Criterion Outputs • mode: visual/verbal/etc. • ~~limits, standards~~ • quantitative: amount /degree/time limits • qualitative
RITERION 1.	e.g., GIVEN -A series of classroom instances of improvements or non-improvements in child behavior (some used in training, others not) -No aids present -Five separate children	e.g., THE STUDENT WILL -The teacher trainee will deliver or not deliver reinforcement -Reinforcement being delivered in varied ways, some new, some old	e.g., RESULTING IN -Correct shaping of gradual approximations (improvements in quantity or quality of child behavior
PREPARATORY 2.	e.g., GIVEN -Given two examples of behavior, one qualifying for reinforcement, the other not -No aids -Examples are new	e.g., THE STUDENT WILL -The teacher trainee will identify the one qualifying for reinforcement -By simply naming the child qualifying for reinforcement	e.g., RESULTING IN -Correct identification of behavior approximation qualifying for reinforcement in the shaping process
3.			

D.2.2

ILLUSTRATION SUMMARIZING PROCEDURES FOR DEVELOPING STATEMENT(S) OF PREPARATORY OBJECTIVES FOR EACH CRITERION OBJECTIVE

PART I

#1 REVIEW DATA

a. Review each criterion objective on FORM D.2(1)

b. Review all forms A.5(4) or (11) associated with the criterion objective for learning analysis results

#2 MAKE DECISION

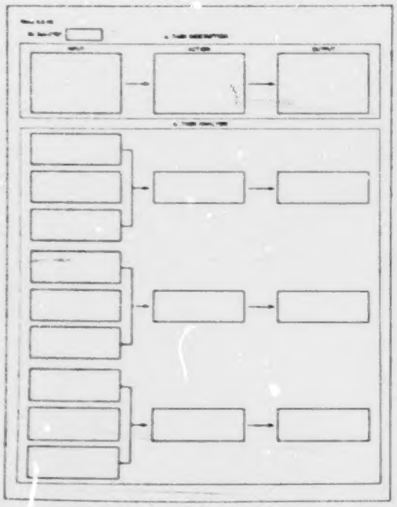
a. Make judgment about ability of students to practice criterion behavior in its entirety without assistance

b. If judgment is YES, do not develop a statement of sub-criterion and/or preparatory objectives

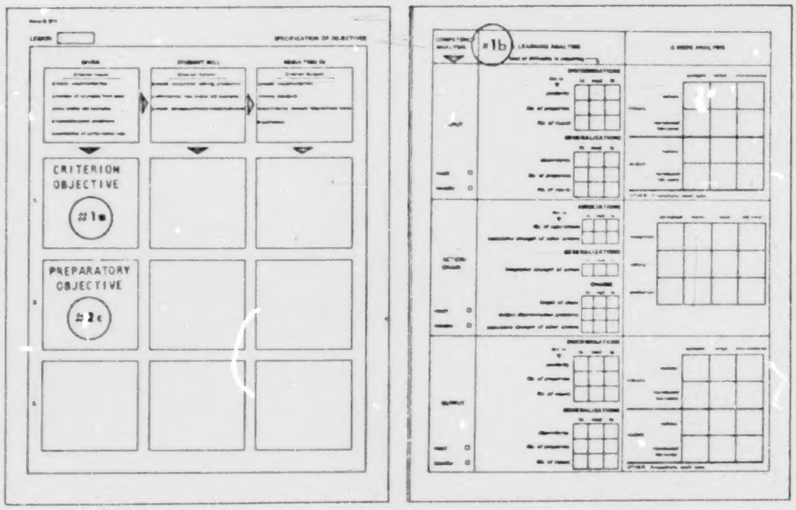
c. If judgment is NO, plan to develop a statement of sub-criterion and/or preparatory objectives

See page 101 for Part II

FORM D.2(1)



FORM A.5(4)



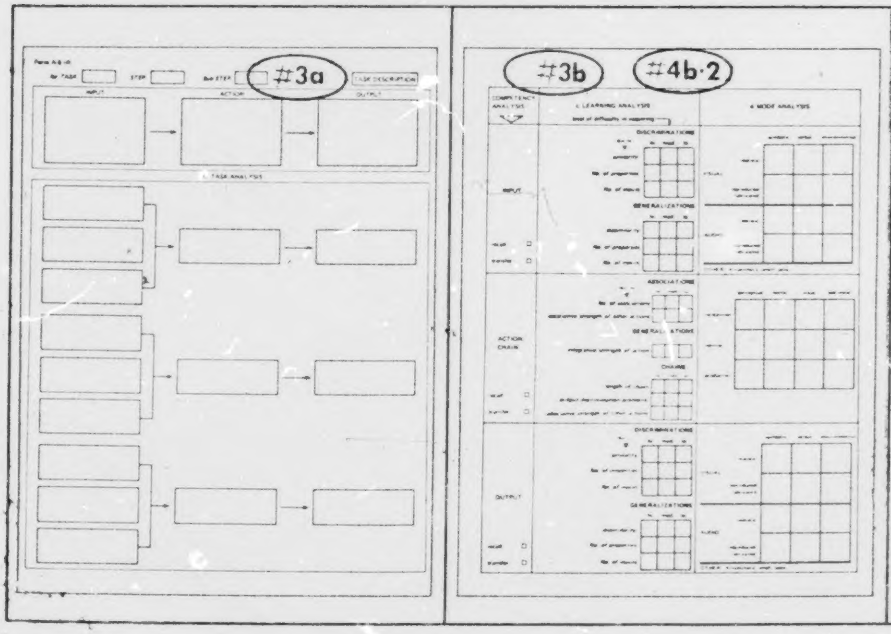
D.2.2

ILLUSTRATION SUMMARIZING PROCEDURES FOR DEVELOPING STATEMENT(S) OF PREPARATORY OBJECTIVES FOR EACH CRITERION OBJECTIVE

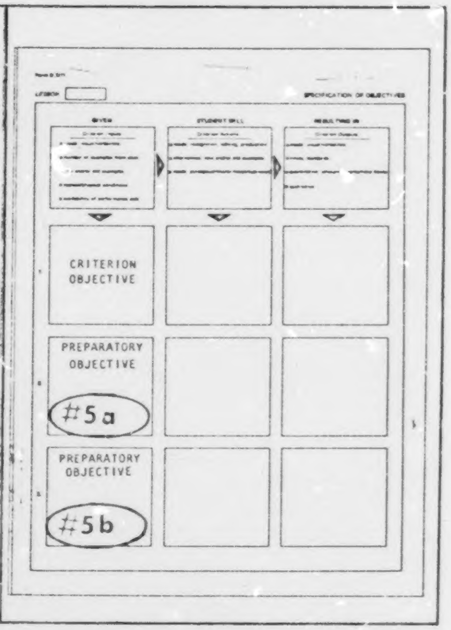
PART II

#3 REVIEW DATA	#4 MAKE DECISION	#5 ACTION TO TAKE
a. Identify on FORM(S) A.5(4) or (11) parts of criterion behavior (covered by criterion objectives) which are potential sub-criterion objectives: ••Self-contained terminal behaviors ••Self-contained or non-self-contained sub-steps b. Review learning results associated with them on FORM A.5(4) or (11)	a. Make judgment about student ability to practice unmodified part of criterion behavior b.1 If YES, do not review component skill information and *proceed to #5a* b.2 If NO, review learning analysis results for component skills, and *proceed to #5b*	a. Develop a preparatory objective b. Develop a preparatory objective for component skills students: ••Do not have ••Will have difficulty learning

FORM A.5(4)



FORM D.2(1)



D.2.2

CRITERIA FOR ASSESSING THE ADEQUACY OF A STATEMENT OF Sub-CRITERION AND PREPARATORY OBJECTIVES

STANDARDS
MATRIX

PROPERTIES	PARSIMONY	COMPLETENESS	OBJECTIVITY	CONTAINS TRAINING AND TESTING IMPLICATIONS
CRITERIA	*-Contains description of sub-criterion objectives ONLY when immediate practice of criterion behavior itself is not possible* *-Contains description of preparatory objective ONLY when immediate practice of sub-criterion part of criterion behavior is not possible*	*-Covers three elements* *••Given (the input to the student)* *••Student will (the action the student takes)* *••Resulting in (the student's output)*	*Description of "given," "student will," and "resulting in" is in terms which are:* *-Observable* *-Measurable* *-Verifiable* *-Subject to the least amount of interpretation (is objective rather than subjective)*	*-Identifies mode or format of problem* *••Multiple choice vs. production* *••Visual/verbal examples* *-Identifies standards* *••Quantity* *••Quality* *••Time requirements*

PREVIEW OF THE NEXT SubSTEP

YOUR PRODUCT	*A statement of objectives for students which identifies:* *--what he will be expected to be able to do* *--what skills he will have to learn to be able to do it.*
WHAT YOU WILL WORK FROM	(1) Statement of objectives to be used by you, the developer (on FORM D.2(1)). (2) Task analysis results.
WHAT YOU WILL DO	(1) Prepare a statement of objectives to be given to students.
FORMS YOU WILL USE	FORM D.2(2) for recording a statement of objectives to be given to students.

DESCRIPTION OF Sub-STEP	D.2.3

INPUT		ACTION		OUTPUT
Preparation of statement of objectives to be used by you [on FORM D.2(1)] + task analysis results vii	→	Prepare a statement of objectives to be given to students viii	→	Statement of objectives for students which identifies: -Performance requirements -Learning requirements ix

Job Aid Contents

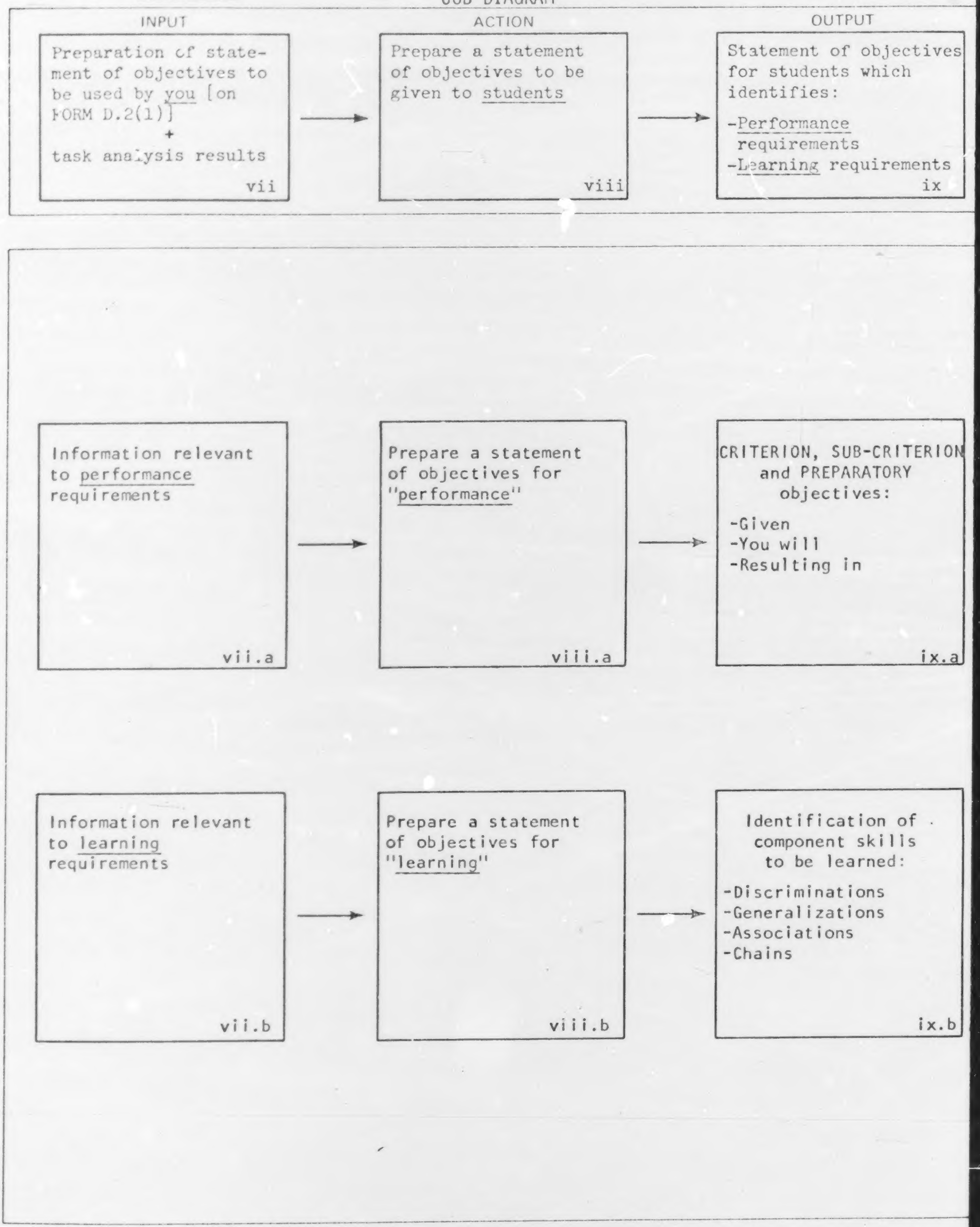
CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: Performance vs. learning requirements . . . 108	-MATRIX: What to describe about performance . . . 109 -MATRIX: What to describe about learning . . . . . 110 -MATRIX: Survey of information to use . . . . . . 114 -MATRIX: What to include in statement of objectives 115	-MATRIX: Adequacy of statement of objectives 121	FORM D.2(2) SUMMARY OF PROCEDURES 120

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
		Completed FORM D.2(1) and FORM A.5(4) or (11) carried forward from:	D.2.2	FORM D.2(2)

Sub-STEP D.2.3

JOB DIAGRAM



INPUT	ACTION	OUTPUT
Preparation of statement of objectives to be used by you [on FORM D.2(1)] + task analysis results vii	Prepare a statement of objectives to be given to students viii	Statement of objectives for students which identifies: -Performance requirements -Learning requirements ix
Information relevant to performance requirements vii.a	Prepare a statement of objectives for "performance" viii.a	CRITERION, SUB-CRITERION and PREPARATORY objectives: -Given -You will -Resulting in ix.a
Information relevant to learning requirements vii.b	Prepare a statement of objectives for "learning" viii.b	Identification of component skills to be learned: -Discriminations -Generalizations -Associations -Chains ix.b

TYPES OF OBJECTIVES
TO BE GIVEN STUDENTS

What Is Described	See page
Distinction between two types of objectives for students	108
A definition of a PERFORMANCE objective	109
A definition of a LEARNING objective	110
Sample form	111

D.2.3

CRITERIA FOR IDENTIFYING TWO TYPES OF INFORMATION IN A STATEMENT OF OBJECTIVES TO BE GIVEN TO STUDENTS ON FORM D.2(2)

IDENTIFICATION MATRIX

TYPES OF INFORMATION	A description of the post-instructional performance	A description of what must be learned during instruction to facilitate post-instructional performance
CRITERIA	1. *What INPUTS will be given the student* 2. *What ACTIONS will he be expected to take* 3. *What standards to meet for OUTPUTS*	1. *What DISCRIMINATIONS he will have to acquire* 2. *What GENERALIZATIONS he will have to acquire* 3. *What ASSOCIATIONS he will have to acquire* 4. *What CHAINS he will have to acquire*
FOR MORE DETAIL AND EXAMPLES SEE ▷	page 109	page 110

D.2.3

DECISION
MATRIX

DETERMINING WHAT TO INCLUDE IN A DESCRIPTION (FOR STUDENTS) OF POST-INSTRUCTIONAL PERFORMANCE

WHAT IS TO BE DESCRIBED	INPUTS given to the student	ACTIONS he is expected to take	OUTPUTS he is expected to produce
ACTION TO TAKE	*Describe:* ·*Objects, people, events, words, symbols, etc.* ·*How many examples* ·*New or old examples* ·*Assistance which is available* ·*Typical/atypical conditions* ·*Problem format (e.g., multiple choice vs. single input)*	*Describe:* ·*Select, edit, or produce* ·*Type of action*	*Describe:* ·*Objects, people, events, words, symbols, etc.* ·*Their properties (quantity, quality)* ·*Standards of acceptability*
EXAMPLES	e.g., *when given any sentence, whether used in instruction or a new one, containing an error in the use of commas with restrictive or non-restrictive clauses* e.g., *when given an example (either one demonstrated or one which has not been demonstrated) of an object which is subjected to stress and then has the stress removed*	e.g., *you will edit the sentence, i.e., insert or remove commas* e.g., *you will label it either as "perfectly elastic" or "not perfectly elastic"*	e.g., *your edited sentence will contain no errors (regarding commas involving clauses)* e.g., *all labels should be correct*

D.2.3

DECISION
MATRIX

DETERMINING WHAT TO CONSIDER FOR INCLUSION IN A DESCRIPTION (FOR STUDENTS) OF WHAT MUST BE LEARNED DURING INSTRUCTION TO FACILITATE POST-INSTRUCTIONAL PERFORMANCE

WHAT IS TO BE DESCRIBED	DISCRIMINATIONS among INPUTS among OUTPUTS	GENERALIZATIONS across INPUTS across OUTPUTS across ACTIONS	ASSOCIATIONS/CHAINS between INPUTS and ACTIONS
ACTION TO TAKE	*Describe:* *Re: INPUTS/OUTPUTS* • *What the classes of inputs to be distinguished are* • *How many classes there are* • *How many and what properties form the basis for the distinction*	*Describe:* *Re: INPUTS/OUTPUTS* • *What the range and limits of each class of inputs are* • *What properties are used to determine whether inputs are similar and belong to the same class* *Re: ACTIONS* • *What alternative actions can be taken*	*Describe:* *Re: INPUTS→ACTIONS* • *Which action goes with which input class* • *What the series of associations to be chained are*
EXAMPLES	e.g., *you will have to learn to tell the difference between the two types of clauses: "restrictive" and "non-restrictive" on the basis of two properties: meaning and type of relative pronoun used*	e.g., *you will have to learn to see the similarity among variations of restrictive and among variations of non-restrictive clauses*	e.g., *you will learn to use a comma for non-restrictive clauses and to omit it for restrictive clauses*
	e.g., *you will have to distinguish between two types (classes) of events: objects returning to their original shape and objects not returning*	e.g., *you will have to see the similarity among a variety of objects, all with different shapes, which belong to one class*	e.g., *you will have to associate the label, "perfectly elastic" object with the class of objects which returns to their original shape, and "not perfectly elastic" with the class that does not*

Form D.2(2)

LESSON

STATEMENT OF OBJECTIVES
FOR STUDENTS

	GIVEN	YOU WILL	YOU MUST LEARN TO
	Inputs ● objects, people, events, words, symbols, etc. ● their properties ● examples number new or old ● availability of performance aids ● typical/atypical conditions ● problem format e.g., single input vs. multiple choice	Actions ● select, edit, or produce ● type of action e.g., point to, label, write, classify, etc. **RESULTING IN** Outputs ● objects, events, words, symbols, etc. ● their properties (quantity/quality) ● standards of acceptability	● distinguish between examples from ___ # ___ input classes ● on the basis of ___ # ___ properties ● see similarity among examples within each of the ___ # ___ input classes ● on the basis of ___ # ___ properties ● associate one of ___ # ___ actions with each one of the ___ # ___ input classes ● exhibit ___ # ___ alternative actions ● exhibit the series of associations in the ___ chain
CRITERION OBJECTIVE 1.	e.g., given any spoken word (of the 100 previously learned) in Mandarin Chinese--presented as single words (may be one or two character words)	-You will give the English equivalent -90% correct will be acceptable	-You will have to learn to tell the difference: ••Between different sounds ••Between the same sound pronounced in all of four tones -You will have to associate an English word with each sound pronounced in a given tone
PREPARATORY OBJECTIVE 2.	e.g., given any spoken word (used before in instruction or new) -100 examples will be used	-You will indicate which of the four tones it is in--by saying 1st, 2nd, 3rd, or 4th -100% identification is required	-You will have to learn to tell the difference between any sound in the Chinese language spoken in either the 1st, 2nd, 3rd, or 4th tone
3			

DETERMINING WHAT THE STATEMENT OF OBJECTIVES FOR STUDENTS WILL BE

INFORMATION	See page
Source(s) of information for preparing objectives	114
What to include in a statement of objectives	115
Examples	116, 117

D.2.3

DECISION
MATRIX

DETERMINING WHICH SOURCES OF INFORMATION TO USE IN DEVELOPING OBJECTIVES FOR STUDENTS

TYPES OF OBJECTIVES	CRITERION OBJECTIVES	Sub-CRITERION OBJECTIVES Unmodified part of criterion behavior	PREPARATORY OBJECTIVES Modified criterion behavior
ACTION TO TAKE	*-Use statement of criterion objectives developed for your own use on:* *FORM D.2(1)*	*-Use statement of sub-criterion objectives developed for your own use on:* *FORM D.2(1)*	*-Use statement of preparatory objectives developed for your own use on:* *FORM D.2(1)* *PLUS* *-Task analysis and learning analysis results on FORM A.5(4) or (11)*

D.2.3

DECISION MATRIX

DETERMINING WHAT TO INCLUDE IN A STATEMENT OF OBJECTIVES FOR STUDENTS

ELEMENTS OF OBJECTIVES TO DESCRIBE	"GIVEN" for either: criterion objectives or sub-criterion objectives	"YOU WILL" and "RESULTING IN" for either: criterion objectives or sub-criterion objectives	"YOU MUST LEARN TO" only for preparatory objectives
ACTION TO TAKE	*Identify:* *-The type of INPUTS* *-Their properties* *-New/old examples to be given* *-Availability of aids* *-Problem format*	*Identify for "YOU WILL"* *-Type of ACTION* *-Mode of ACTION (select, edit, or produce)* *Identify for "RESULTING IN"* *-Type of OUTPUT* *-Properties of OUTPUT (quantity/quality)* *-Standards of acceptability*	*Identify:** *-Name and number of INPUT classes to be discriminated* *-The properties that form the basis for the discrimination* *-The nature of the similarity that has to be seen among inputs within a class* *-The properties that form the basis for the similarity* *-The specific associations that have to be established between inputs and actions* *-The alternative actions that can be taken* *-The series of associations that make up the chain*

EXAMPLES	See pages 116 and 117

**Identify only those component skills students or trainees do NOT already have and which they must learn.*

Form D.. (2)

LESSON ☐

STATEMENT OF OBJECTIVES
FOR STUDENTS

EXAMPLES

	GIVEN	YOU WILL	YOU MUST LEARN TO
	Inputs • objects, people, events, words, symbols, etc. • their properties • examples: number, new or old • availability of performance aids • typical/atypical conditions • problem format e.g., single input vs. multiple choice	Actions • select, edit, or produce • type of action e.g., point to, label, write, classify, etc. RESULTING Outputs • objects, events, words, symbols, etc. • their properties (quantity/quality) • standards of acceptability	• distinguish between examples from ___ # ___ input classes • on the basis of ___ # ___ properties • see similarity among examples within each of the ___ # ___ input classes • on the basis of ___ # ___ properties • associate one of ___ # ___ actions with each one of the ___ # ___ input classes • exhibit ___ # ___ alternative actions • exhibit the series of associations in the ___ chain
CRITERION 1.	Given a verbal question about the consequences for behavior of "reinforcement," "punishment," or "ignoring," which occurs following the behavior	You will verbally describe the consequences; all three verbal statements will correctly identify the consequences	You must learn to distinguish between three types of operations which can follow behavior (having the properties of desirableness or aversiveness) and you will have to learn to connect or associate the effect on subsequent behavior these operations have
SUB-CRITERION 2.	Given the verbal term "reinforcement" and the instruction to define it by listing all its relevant properties	You will list (produce) the properties and give two or more examples of "reinforcement" You will list all relevant properties and give at least two correct examples	You must learn to distinguish between definitions or between examples which qualify for the class "reinforcement" and those which do not; you must also see the similarity among various examples within the class
PREPARATORY 3.	Given contrasting verbally described examples of "reinforcement" and "non-reinforcement" (new or old examples)	You will select the examples which represent "reinforcement" The standard is 100% correct identification in at least five examples	You must learn to distinguish between verbally described examples which are or are not instances of "reinforcement" and to see similarities within each class

Form D.2(2)

LESSON ☐

STATEMENT OF OBJECTIVES
FOR STUDENTS

EXAMPLES

	GIVEN	YOU WILL	YOU MUST LEARN TO
	Inputs • objects, people, events, words, symbols, etc. • their properties • examples: number, new or old • availability of performance aids • typical/atypical conditions • problem format e.g., single input vs. multiple choice	Actions • select, edit, or produce • type of action e.g., point to, label, write, classify, etc. RESULTING IN Outputs • objects, events, words, symbols, etc. • their properties (quantity/quality) • standards of acceptability	• distinguish between examples from ___ # ___ input classes • on the basis of ___ # ___ properties • see the similarity among examples within each of the ___ # ___ input classes • on the basis of ___ # ___ properties • associate one of ___ # ___ actions with each one of the ___ # ___ input classes • exhibit ___ # ___ alternative actions • exhibit the series of associations in the ___ chain
TERION 1.	Given a projector and a reel of film (only a brand of projector you have practiced with before) and with a pictorial diagram of the threading operation	You will thread the film through the projector The projector will operate correctly (in at least two trials)	You must learn to follow all the steps in the threading operation--in their correct sequence; you must learn to distinguish between correct and incorrect configurations at each sub-step in the operation
CRITERION 2.	Given a projector and film threaded up until the "loop" and with a diagram of a correct loop--with guide marks for correct height	You will make a loop within the limits marked on the projector	You will have to learn to distinguish between loops which are O.K. and those that are too high or those that are too short; you will have to see the similarity among loops within the acceptable range
ARATORY 3.	Given a single example of a loop (either acceptable or unacceptable) (at least three such examples, some right and some wrong)	You will indicate whether it is O.K. or not O.K. 100% correct identification	Same as above

JOB PROCEDURES

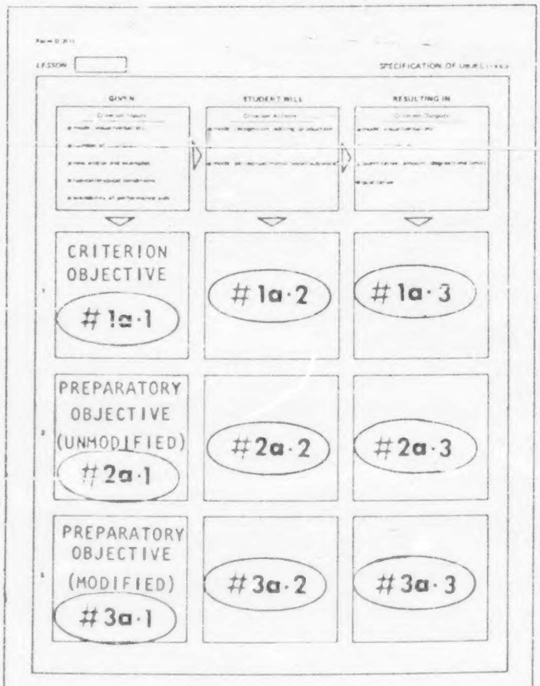
	page
SUMMARY OF PROCEDURES	120
Assessing adequacy of statement of objectives	121
FORM D.2(2)	123

D.2.3

ILLUSTRATION SUMMARIZING PROCEDURES INVOLVED IN DEVELOPING A STATEMENT OF OBJECTIVES FOR STUDENTS

#1 CRITERION OBJECTIVE	#2 PREPARATORY OBJECTIVE UNMODIFIED	#3 PREPARATORY OBJECTIVE MODIFIED
a. On FORM D.2(1) review:	a. On FORM D.2(1) review:	a. On FORM D.2(1) review:
a.1 GIVEN	a.1 GIVEN	a.1 GIVEN
a.2 STUDENT WILL	a.2 STUDENT WILL	a.2 STUDENT WILL
a.3 RESULTING IN	a.3 RESULTING IN	a.3 RESULTING IN
b. On FORM D.2(2) record:	b. On FORM D.2(2) record:	b. On FORM D.2(2) record:
b.1 GIVEN	b.1 GIVEN	b.1 GIVEN
b.2 STUDENT WILL	b.2 STUDENT WILL	b.2 STUDENT WILL
b.3 RESULTING IN	b.3 RESULTING IN	b.3 RESULTING IN
c. On FORM A.5(4) or (11) review task analysis results (not illustrated)	c. On FORM A.5(4) or (11) review task analysis results (not illustrated)	c. On FORM A.5(4) or (11) review task analysis results (not illustrated)
d. On FORM D.2(2) identify what "YOU MUST LEARN"	d. On FORM D.2(2) identify what "YOU MUST LEARN"	d. On FORM D.2(2) identify what "YOU MUST LEARN"

FORM D.2(1)



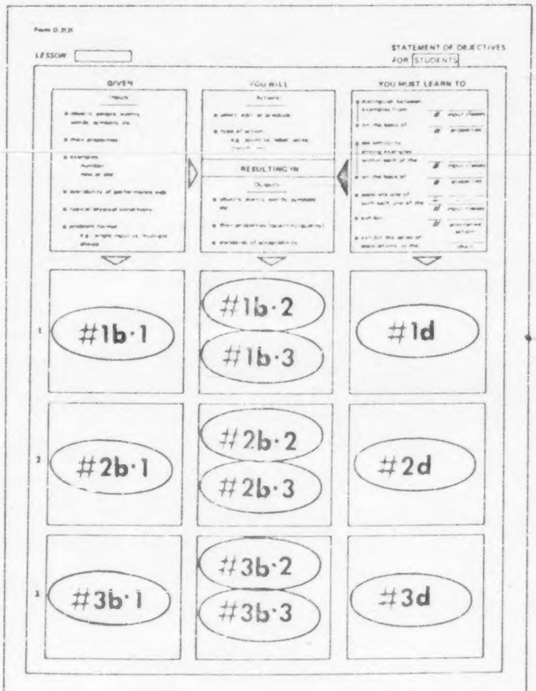
Form D.2(1)

LESSON

SPECIFICATION OF OBJECTIVES

GIVEN	STUDENT WILL	RESULTING IN
CRITERION OBJECTIVE #1a·1	#1a·2	#1a·3
PREPARATORY OBJECTIVE (UNMODIFIED) #2a·1	#2a·2	#2a·3
PREPARATORY OBJECTIVE (MODIFIED) #3a·1	#3a·2	#3a·3

FORM D.2(2)



Form D.2(2)

LESSON

STATEMENT OF OBJECTIVES FOR STUDENTS

GIVEN	YOU WILL	YOU MUST LEARN TO
#1b·1	#1b·2 #1b·3	#1d
#2b·1	#2b·2 #2b·3	#2d
#3b·1	#3b·2 #3b·3	#3d

D.2.3

STANDARDS
MATRIX

CRITERIA FOR ASSESSING THE ADEQUACY OF A STATEMENT OF OBJECTIVES FOR STUDENTS

PROPERTIES	COMPLETENESS	OBJECTIVITY	APPROPRIATE FOR TARGET AUDIENCE
CRITERIA	-Covers four elements ··Given (the input to the student) ··You will (the action the student must take) ··Resulting in (the student's output) ··You must learn to (the component skills the student must learn)	Description of "given," "student will," and "resulting in" is in terms which are: -Observable -Measurable -Verifiable -Subject to the least amount of interpretation (is objective rather than subjective)	-Language describing component skills should be non-technical: ··Distinguish between or see the difference between (rather than discriminate) ··See the similarity (rather than generalize across) ··Do ___ when you are faced with ___ (rather than associate an action with an input) -Vocabulary should be geared to the target audience

Form D.2(2)

LESSON ☐

STATEMENT OF OBJECTIVES
FOR STUDENTS

	GIVEN	YOU WILL	YOU MUST LEARN TO
	Inputs • objects, people, events, words, symbols, etc. • their properties • examples: number new or old • availability of performance aids • typical/atypical conditions • problem format e.g., single input vs. multiple choice	Actions • select, edit, or produce • type of action e.g., point to, label, write, classify, etc. **RESULTING IN** Outputs • objects, events, words, symbols, etc. • their properties (quantity/quality) • standards of acceptability	• distinguish between examples from ___ # ___ input classes • on the basis of ___ # ___ properties • see similarity among examples within each of the ___ # ___ input classes • on the basis of ___ # ___ properties • associate one of ___ # ___ actions with each one of the ___ # ___ input classes • exhibit ___ # ___ alternative actions • exhibit the series of associations in the ___ chain
1.			
2.			
3.			

Form D.2(2)

STATEMENT OF OBJECTIVES
FOR STUDENTS

LESSON ☐

	GIVEN	YOU WILL	YOU MUST LEARN TO
	Inputs • objects, people, events, words, symbols, etc. • their properties • examples: number new or old • availability of performance aids • typical/atypical conditions • problem format e.g., single input vs. multiple choice	Actions • select, edit, or produce • type of action e.g., point to, label, write, classify, etc. **RESULTING IN** Outputs • objects, events, words, symbols, etc. • their properties (quantity/quality) • standards of acceptability	• distinguish between examples from ___ # ___ input classes • on the basis of ___ # ___ properties • see similarity among examples within each of the ___ # ___ input classes • on the basis of ___ # ___ properties • associate one of ___ # ___ actions with each one of the ___ # ___ input classes • exhibit ___ # ___ alternative actions • exhibit the series of associations in the ___ chain
1.			
2.			
3.			

STEP D.2

COMPLETION CHECKLIST

	IDENTIFIED	PERFORMED	PRODUCED	FORMS COMPLETED
2.1			Statement of all criterion objectives for a lesson	D.2(1)
2.2			Statement of all sub-criterion and preparatory objectives for each criterion objective	D.2(1)
2.3			Statement of objectives for students for each lesson	D.2(2)